

THE INDEPENDENT GUIDE TO IBM PERSONAL COMPUTERS



Volume 3 Number 8
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May 1, 1984

IBM

Keyboard Power!

PC Exclusive:
Price Waterhouse
Reports on
Accounting
Software for
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- *Macros*
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- *New Fonts*
- *Modifications*

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On-Line
Homelink**

**PC Evaluates
Samna Word
Processor**

**Hardware
Review: STB's
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**Compared:
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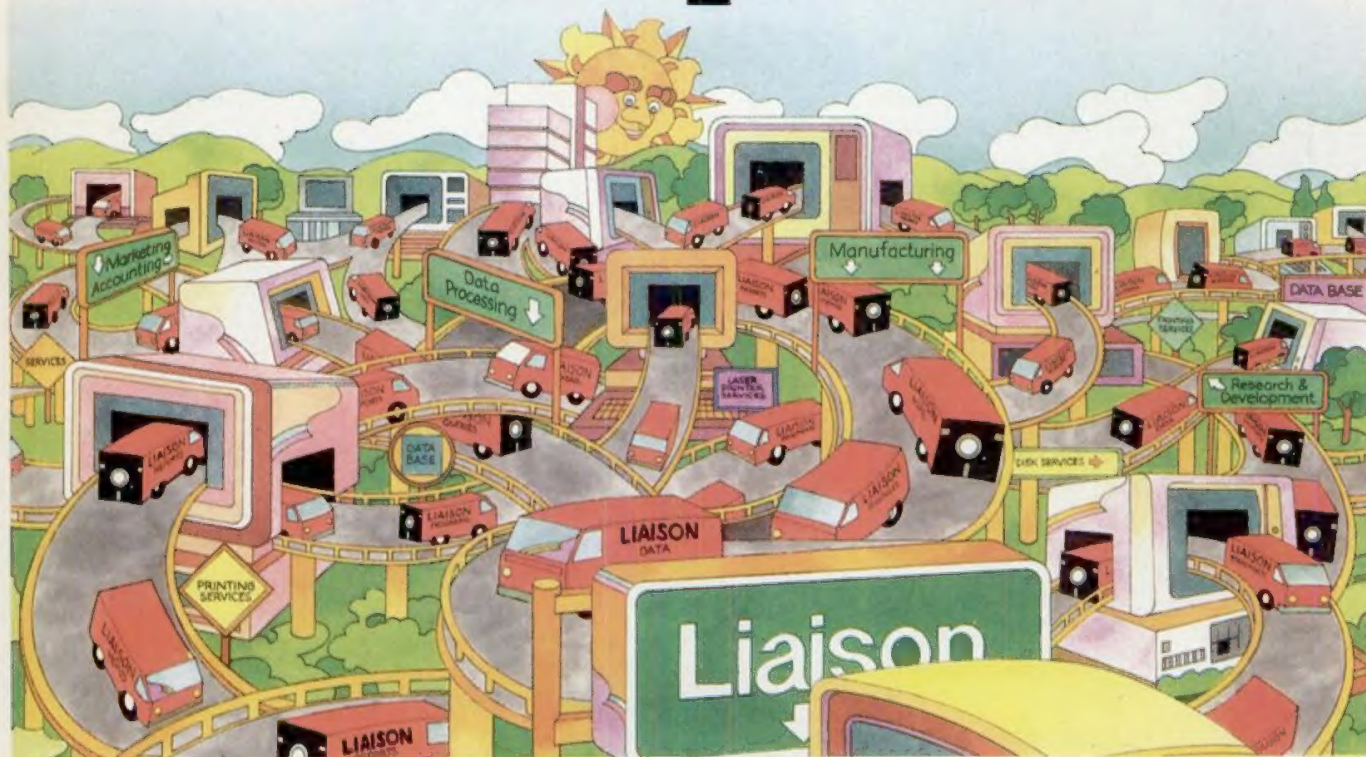
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CIRCLE 454 ON READER SERVICE CARD

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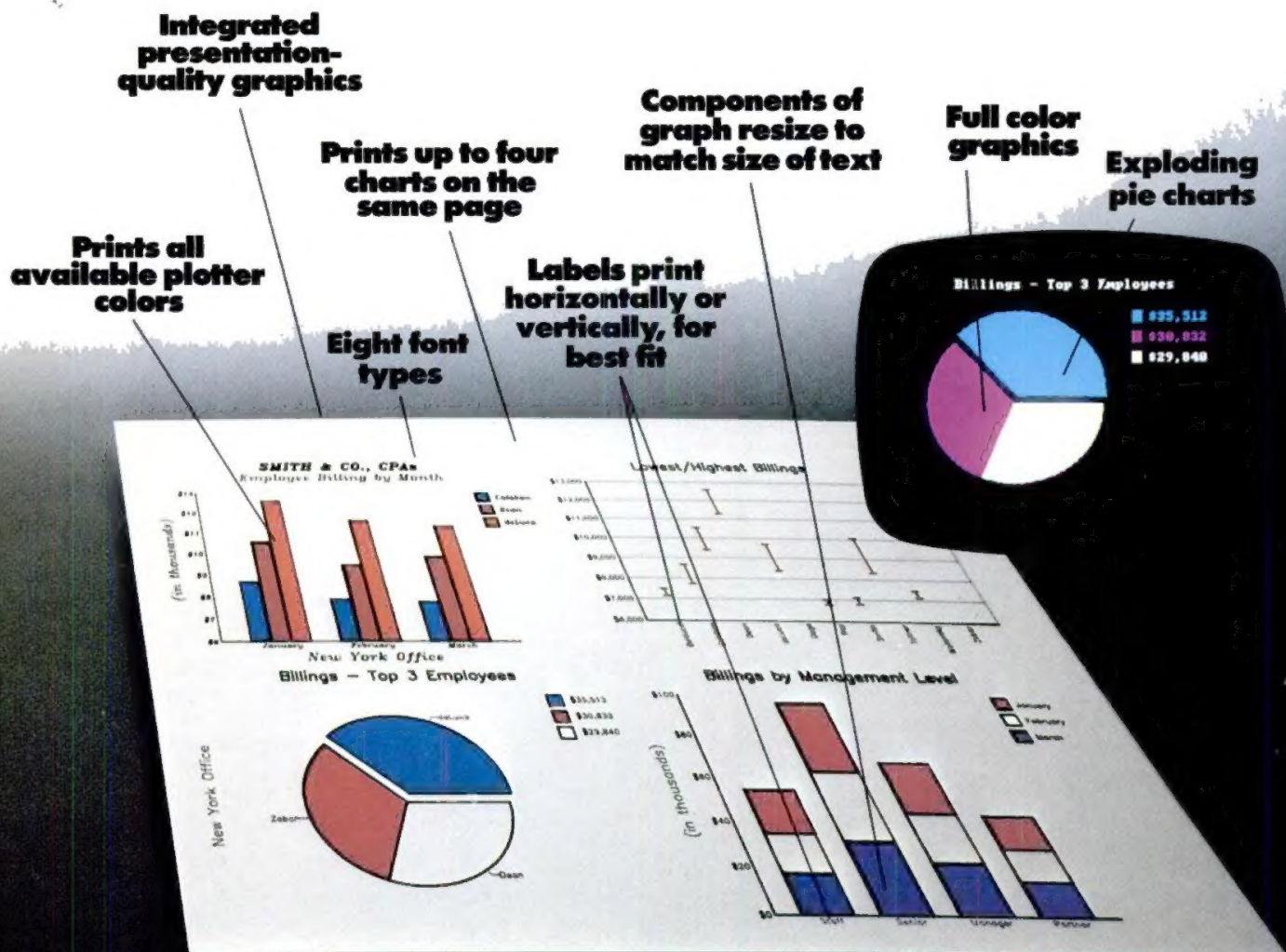
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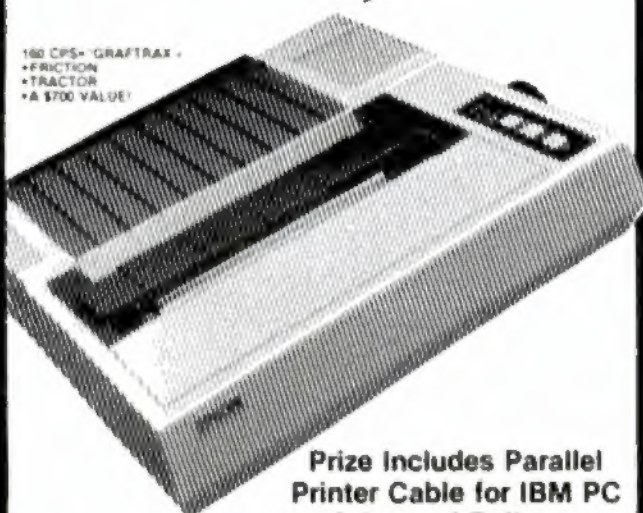
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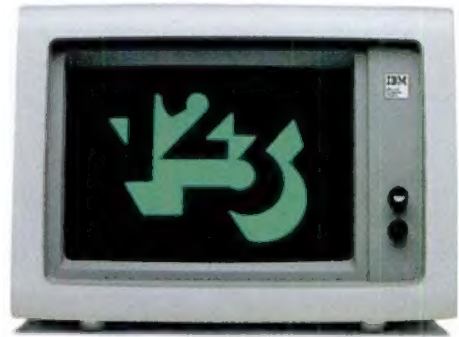
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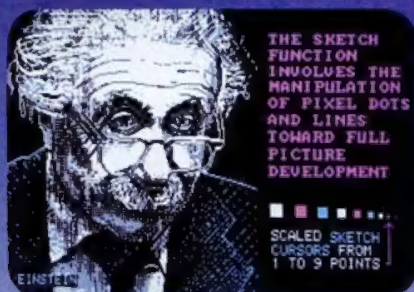
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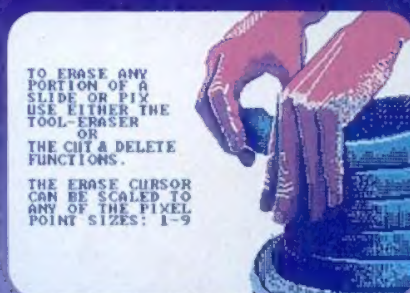
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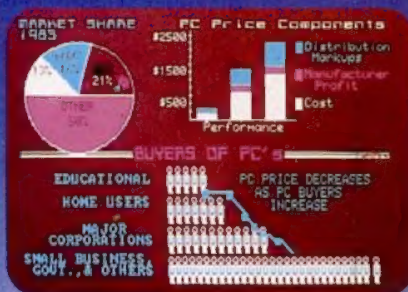
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What's Inside

If this issue's cover story on the myriad uses of macros has taken you by surprise, place the blame on us. A serendipitous series of events led to a last minute switch of cover topics.

Some of our readers, especially those who like to prepare themselves for the wealth of information that *PC* provides every 2 weeks, may be slightly confused by this issue's cover package. They may, in fact, have been running to their back-issue library and scanning through past "Coming Up" sections in a futile effort to find some advance warning of a future issue about the uses of macros. They may even now be searching the masthead for our phone number, intending to phone and ask why they never received the magazine that covered this topic.

Well, if you are one of those conscientious readers, let us reassure you: You have not missed an issue. (Would we neglect such nice people that way?) However, it is all our fault—in this issue, we decided to present a series of interesting, useful articles that were, to be totally honest, simply not planned.

There are extenuating circumstances, which we would like to present in our defense. But first, it would be best to explain the process through which our cover stories are chosen.

A couple of months ago, in the interests of proper procedure, organization, and general sanity, editor Bill Machrone called a meeting of managing editor Barry Owen, executive editors Mike Edelhart and Connie Winkler, and various and sun-



dry other concerned parties. The purpose was to determine the themes of each issue of *PC Magazine* for the coming year.

Remember that the staff and writers of *PC* are neither newspaper people nor sales representatives. They are used to, shall we say, more leisurely deadlines. Many come from monthly magazines, where there was time to take care of such minor but useful tasks as reading the manuscripts that come in. Others are computer company refugees who thought they would find a less hectic lifestyle away from Silicon Valley, or erstwhile programmers who up until now have spent most of their careers carefully checking over every semicolon, space, and period in their programs to make sure

nothing could possibly go wrong.

For many, suddenly being on the staff of a magazine that comes out every 2 weeks has been quite a shock. They aren't used to it. For example, it came as quite a surprise to one particular editor when she was informed that this particular column was due.

"But I just wrote the last 'What's Inside' only a couple of weeks ago!" she pleaded one Friday at 5:05 p.m., mindful of the ten or so free-lance manuscripts that lay neglected on her desk.

"Exactly," replied managing editor Owen calmly. "I'd prefer to have it in this afternoon, but I'll give you until 10 a.m. on Monday."

The increased pace has also had its effect on the free-lance writers whose work makes up the bulk of the magazine. Those, especially, who were regulars on the 1983 monthly editions of *PC* have been somewhat disconcerted by editors camping on their doorsteps to make sure manuscripts are submitted on time.

"But you said I could have until Thursday to finish the article," the hapless writer might complain. "It's only Monday!"

"Exactly," replied the editor (who has been taking lessons from Barry Owen) calmly. "I need a finished manuscript today, so that I can read it, decide that at least half of it is unusable, and then have you do a rewrite."

WHAT'S INSIDE

"But what if you like it the way it is, without a rewrite?"

"Then we'll have it ahead of time, won't we?"

To this unimpeachable logic, the writer (who may have actually been planning to hand in the manuscript 3 days late) usually must accede.

In the face of all this, a group of *PC* editors decided to set up a plan by which cover stories are planned out an entire year in advance. That way, writers and editors have guidelines they can use to try to get things in on time with a minimum of problems and/or nervous breakdowns.

Of course, these guidelines are not a hard and fast, unbreakable schedule. This is, after all, a magazine that tries to bring its readers the latest in news about computers in general and PCs in particular. Some concessions must and will be made for sudden and important developments in the field. If, for example, IBM suddenly announced that it had produced a verbally user-friendly microcomputer ("Don't touch that keyboard yet, you moron—I'm still checking my memory!") you can rest assured we wouldn't ignore it.

Now that you understand *PC* scheduling, it will be easier to understand how the theme of this issue's cover came about. Having set up this highly professional system and carefully planned for all possible contingencies, Bill Machrone was somewhat startled to realize that he had somehow acquired a group of stories concerning ways to enhance and simplify word processing and graphics on the PC.

There was, for example, Steve Sall's article covering all the basics of macros—programs that allow users to create keyboard abbreviations for groups of computer functions. Judith Epstein, coincidentally, had just given us a way to make *WordStar* easier and faster using her MAGNIFIKEY program. Hugh Jackson drew the graphics side of the picture with his story on how to create and store new fonts for use on dot matrix printers, and John Walkenbach followed up with an explanation on how to redefine standard characters

into different dot configurations.

Machrone also found a whole series of informative articles on producing the best possible graphics on the PC. Frank Derfler introduced *Energraphics*, a new business-graphics software package that can produce not only graphs, but line and three-dimensional drawings as well. Winn Rosch reviewed the new STB Graphics Plus color board that, among other things, should stop your color monitor from constantly flickering. Barry Waldman, a graphics designer with his own studio, has described how he turned his PC into a drawing pad capable of producing a variety of complex color graphics on a single sheet of paper. And there was an excerpt from a book by Bernd Enders and Bob Petersen on working with graphics characters.

That these stories were all available at about the same time seemed almost too good to be true. It seemed, in fact, to be an act of fate, and the magazine business is much too uncertain to ignore acts of fate. So it was decided that this issue would feature as a cover package these interrelated stories about macros and your PC, and that all the other cover packages would be pushed back an issue.

Of course, since no issue sticks completely to a single theme, you'll also find a flock of articles on what's new with the PC. For example, Heidi Waldrop contributed a piece examining the best way to introduce your "significant other" to your personal computer. On a more technical slant, Barbara Krasnoff tells about a group of University of Utah faculty members who developed a program that enables owners of microcomputers to produce their own microcomputer chips. And, in an "up-to-the-minute" report, Edward Baras tells all about the new offspring of Lotus' 1-2-3: *Symphony*, the integrated software package that Lotus claims is the most powerful business-productivity software tool ever offered.

Not surprisingly, all the last minute changes in the issue created a little confusion at first. It is somewhat disconcerting

for an editor to march into Mike Edelhart's office, waving a manuscript triumphantly and shouting, "I got it! I had to make 16 phone calls, knock on the writer's door at 4 a.m., and get my brother to pretend he was a hit man, but I got the article on the Cray computer in on time!"

"Oh, didn't I tell you?" Edelhart says, somewhat sheepishly. "The Cray package was pushed back an issue. We're working on macro articles this week."

With our next issue, we will be back on track with the complete story of how the IBM PC is slowly inching up on the legendary Cray computer. That is, of course, unless the editors find they have a new cover story that simply has to make it into to the next possible *PC*. . .

* * *

Since *PC*'s offices are located in New York, and many software manufacturers are based outside of the city's environs, there is occasionally a slight clash of cultures. Something of the sort occurred a few weeks ago, when associate editor Stephanie Stallings had an appointment to meet with representatives of a company producing a new integrated software package.

Stallings had dashed down to the building's lobby to grab herself a snack before the interview. As she re-entered the elevator, she found herself in the company of four tall, extremely clean-cut gentlemen in complete business regalia who looked as if they had stepped out of a Brooks Brothers ad. Stallings immediately knew that they had to be visitors to the city, and she further suspected that they were the software people she was expecting. Her suspicions were confirmed when they followed her out of the elevator and into the magazine's reception area.

Before they could introduce themselves to the young woman at the front desk, Stephanie explained that, "I think these gentlemen are here to see me."

The receptionist, New Yorker born and bred, stared at the clean-cut quartet standing before her. "Boy, are you lucky," she said. ■

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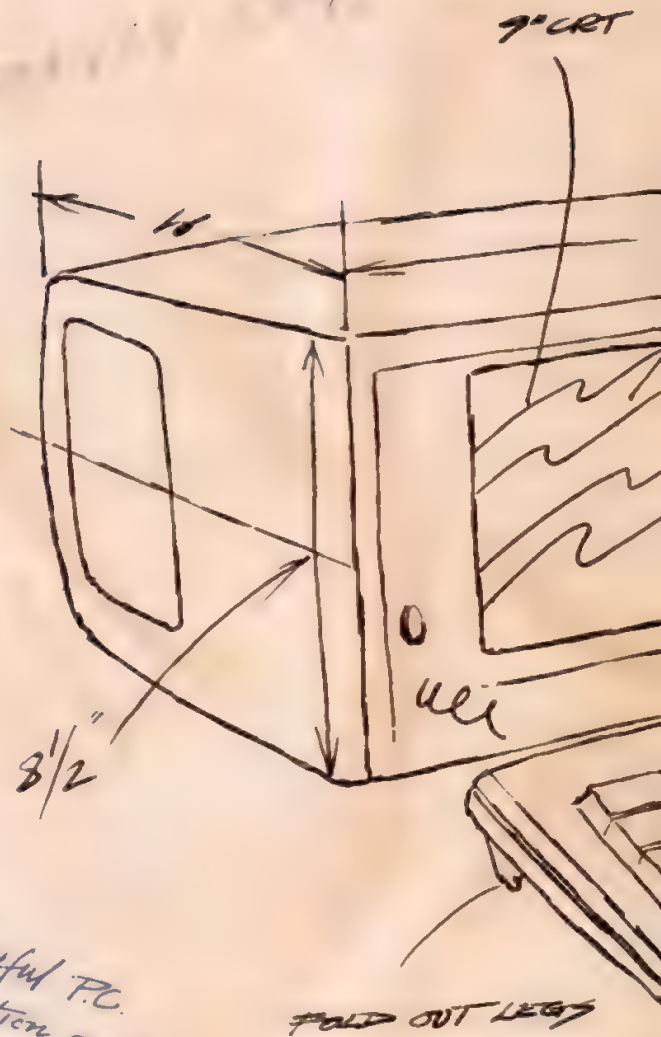
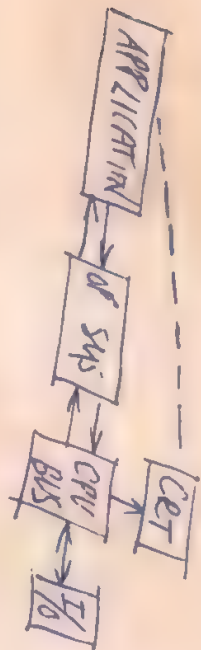
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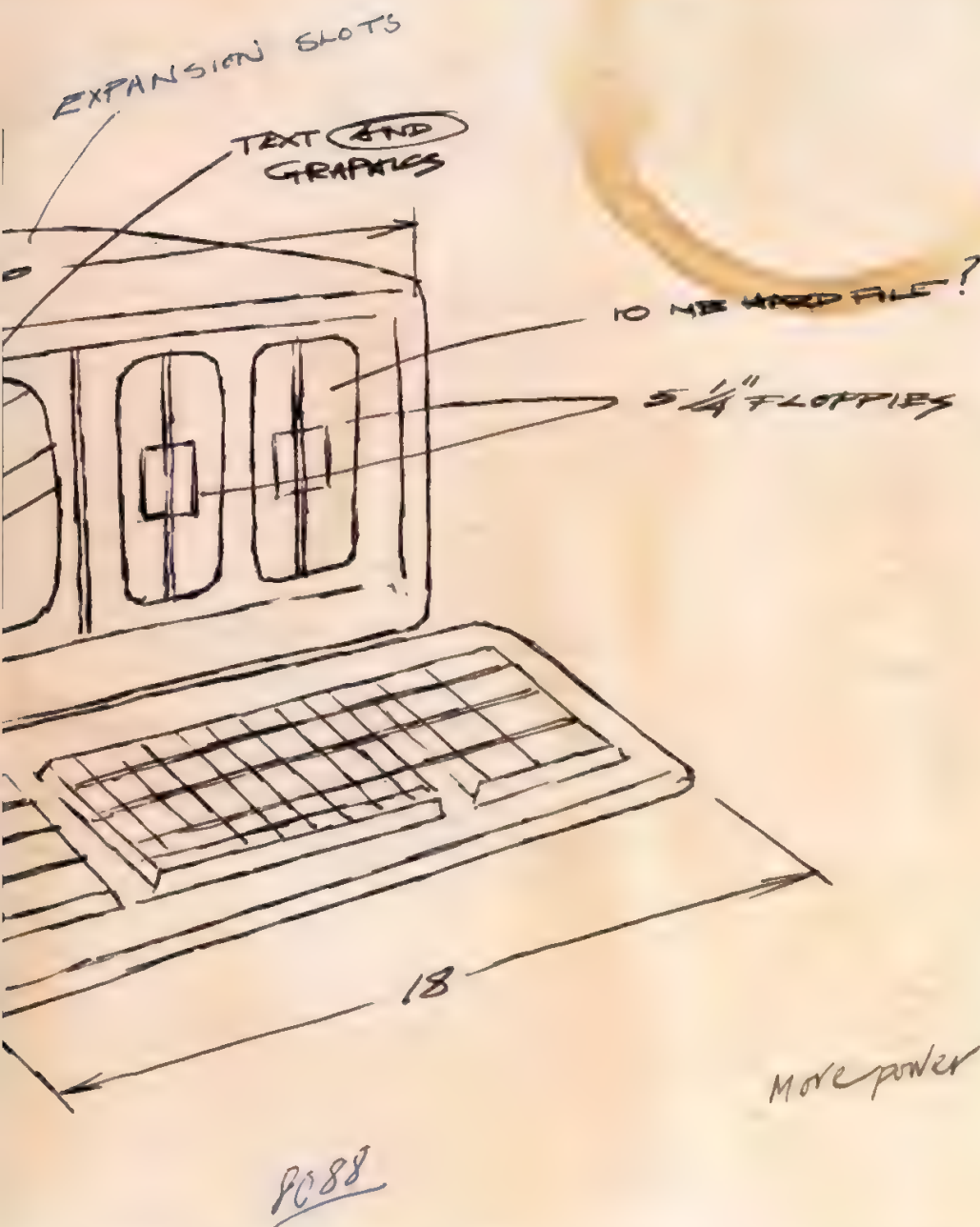
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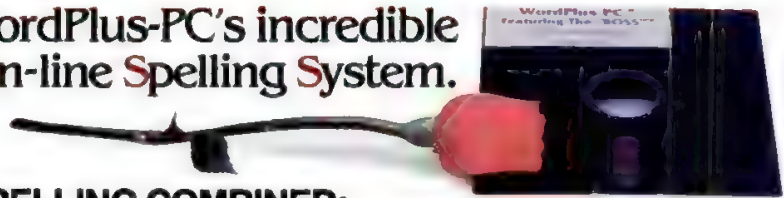
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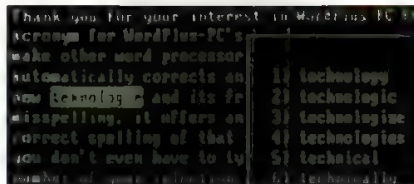
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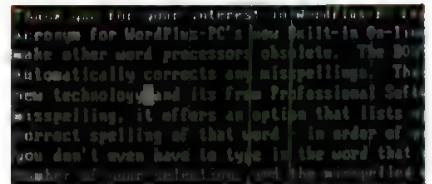
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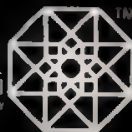


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5-1/4" single-side, double-density, soft sector	IBM PC (single-side), Apple II, Commodore, TRS-80 Model III	34968	2.47	34974	\$2.81	MD523-01-18138	\$2.66
5-1/4" double-side, double-density, soft sector	IBM PC (dual side)	34624	3.50	34980	3.74	MD330-01-18188	4.10
8" single-side, single-density, soft sector IBM Format 2305830	Radio Shack TRS-80 Model I	33428	2.55	34998	3.06	FD34-1000-3718	2.66
8" single-side, double-density, soft sector	Radio Shack TRS-80 Model II			34021	3.23	FD34-8000-18137	3.40
Description	Part Number	1 to 4 Cases		5 to 9 Cases		10 or More Cases	
5-1/4" Library Case	Mini-K/10	\$2.50 Each		\$2.00 Each		\$1.50 Each	
8" Library Case	KAS/10	3.94 Each		3.15 Each		2.36 Each	
Cases sold only with another item.							
Description	Part Number	Number Per Box		Exact Price Per 1000		Estimate Price Per Box	
14-7/8" x 11", 132-Column Fanfold Paper-No Vertical Perforation-Tractor Holes on Both Sides							
One Part 1/2" Green Bar	14112GBMP-15	1500 Sheets		\$16.04		\$24.06	
9-1/2" x 11", 80-Column Fanfold Paper, 1-Right & 1-Left Vertical Perforation-Tractor Holes on Both Sides							
One Part Blank	9510PPMP-15 lb.	1500 Sheets		\$11.68		\$17.52	
Nashua Line Printer Labels-Pressure Sensitive							
3-1/2x15/16 White One Up-One Wide	10350-1	5000 Labels		\$2.60		\$13.00	
3-1/2x15/16 White Four Up-Four Wide	10350-4	20,000 Labels		2.60		52.00	

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Al Savage
83

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CIRCLE 117 ON READER SERVICE CARD

IBM News

FROM THE EDITORS OF PC

MAY 1, 1984

Software Fund to Pirates: Money for Our Disks

Software biggies' new fund will use advertising, media campaigns to fight unauthorized disk copying—threatens lawsuits against companies who don't comply

BY KAREN COOK

NEW YORK—Microcomputer software makers are madder than hell about software piracy. They have formed the Software Protection Fund to shout—in unison—that they are not going to take it any more.

The Fund, led by Ashton-Tate president David Cole, has a one sentence gospel: Piracy is illegal. The group intends to teach pirates the error of their ways through educational booklets, speeches to corporations, direct mail, and releases to the news media. For anyone who doesn't hear the Word immediately, however, the group has a follow-up threat: Violators will be prosecuted.

Corporate Copying

Big corporations will be particular targets of legal actions, since they can easily afford to pay for the software they use. According to Cole of Ashton-Tate, Lotus Development Corporation's \$10 million action against Rixon, Inc. will serve as a model for new lawsuits by leading software vendors. "The Lotus suit was very effective for all of us," says Cole, adding that the Fund will supply expert testimony and legal advice in future cases.

"If we don't get our arms

around the problem, the problem will get its arms around us," continues Cole. "Whether because of casual pilfering or piracy for profit, there are two to ten times more unauthorized disks than authorized disks in use," Cole reports. Experts estimate that such piracy may have caused industry losses ranging

many as 60 software firms interested in joining the crusade. "We have finally gotten a bunch of pigheaded entrepreneurs to agree on something: Piracy hurts us all," comments Cole.

The Software Protection Fund grew out of the microcomputer software association section of ADAPSO (Association of Data

with a professional, well-funded advertising and public relations program," says Cole. "ADAPSO can't move fast, and it doesn't have a good record of dealing with the press."

ADAPSO's Position

"ADAPSO doesn't have the resources for a big ticket advertising campaign, and we didn't want to risk being countersued if there were any legal actions," explains ADAPSO president Jerry Dreyer. While the Protection Fund mounts its public relations campaign, ADAPSO committees will continue to delve into the thornier technical and legislative issues surrounding software protection. "ADAPSO will work hand in glove with the fund," Dreyer says.

The Fund is the industry's response to its members' increasing demands for fast action on piracy. "The Software Protection Fund represents the natural evolution of the industry," says Bill Senske, vice president of marketing at Formaster, which makes duplication machines most manufacturers use to produce software. "Until now these companies were too busy inventing and marketing their products to worry about piracy. Now

(continued)

MINDSET'S ARTISTIC COMPUTER



Now that we've got windows, we'll need something to put in them. The Mindset PC may have the graphics of the future. See page 49.

from \$360 million to \$1 billion in the last 2 years.

With numbers like that, it's no wonder the industry is fighting mad.

More than \$500,000 has been pledged to the group's coffers since its inception at Comdex last November, and more money still is likely to pour in from as

Processing Service Organizations), long the mainframe software industry's trade association. David Cole, also head of that committee, decided that he could bring the anti-piracy message to the public faster by starting a new group.

"We needed a resource-rich, agile group to move forward

\$99 VisiCalc—A Cheap Shot In Spreadsheet Split

Software Arts escalates its legal battle with VisiCorp—drops price bomb in direct sale of Advanced Version VisiCalc for IBM PC

BY JAMES LANGDELL

VisiCalc for \$99! Have you ever seen prices like that? What's more amazing is that this advertised price is for *Advanced Version VisiCalc*—an upgraded package that hasn't been available to IBM PC users until now. After all, VisiCorp's current list price is \$250.

Is the bargain-price version advertised by a hungry mail-order house as a loss leader? No, if you call the 800-number, a copy of *VisiCalc* will be sent to you by Software Arts, which created the original bestselling spreadsheet in 1979.

One odd thing about this \$99 *VisiCalc* package—VisiCorp's name isn't on it. The reason? Software Arts' price-slashing is a new marketing maneuver in the back-and-forth legal battle between the two software makers.

A Pair of Suits

This February, Software Arts sued VisiCorp and announced that it would begin selling *VisiCalc* itself, after terminating an agreement that has given VisiCorp exclusive rights to market the program since 1979. Last September, VisiCorp began legal action against Software Arts for late delivery of updates to *VisiCalc*. (For an earlier report on the lawsuits, see "Visi On Debuts In Confusing Times" in *PC*, Volume 3 Number 6, page 33.)

VisiCorp disputes the termination and is continuing to market *VisiCalc*. VisiCorp, however, was denied a preliminary court order that would have prohibited Software Arts from using the *VisiCalc* tradename. With the legal barriers apparently cleared away, Software Arts' first move into the marketplace is to run newspaper ads

for the next 2 to 4 months offering *VisiCalc Advanced Version* for the IBM PC at a very low price.

Now that's aggressive pricing—but the result may be more like a self-destructive Kamikazi attack. After introducing its new version of *VisiCalc* at such a low price, Software Arts—or VisiCorp—may have a hard time in the future convincing consumers that the program is worth any more than \$100. And retailers are unlikely to give Software Arts much support after it spends a few months marketing its product exclusively through mail and phone orders.

A Disputed Agreement

In April 1979, the two companies signed a software distribution agreement, which gave VisiCorp (then called Personal Software, Inc.) an exclusive worldwide license to sell *VisiCalc*, a program developed for the Apple II. Software Arts was to receive royalties of at least 35.7 percent of *VisiCalc*'s net sales price.

This agreement included provisions for VisiCorp to "make its best efforts to maximize sales" of the product, and for Software Arts to modify the program for other personal computers. These two points are now at issue in lawsuits between the two companies, filed in the past few months.

VisiCorp had filed a lawsuit against Software Arts in September 1983. One VisiCorp claim was that Software Arts had failed to deliver *VisiCalc Advanced Version* updates for the IBM PC and other personal computers, which it had promised to do more than a year before. In its suit, VisiCorp also sought damages because Soft-

ware Arts was 6 months late in delivering the *Advanced Version* for the Apple IIe, and because the version it supplied for the Apple III was defective as well as late.

VisiCorp accused Software Arts of neglecting *VisiCalc* while creating *TK!Solver*, the first software product that was marketed by Software Arts under its own name.

Software Arts answered in its countersuit filed on February 7, 1984, that it delivered the final software for the IBM version of *VisiCalc Advanced Version* on December 28, 1983—over 3 months after VisiCorp sued Software Arts. In January, however, VisiCorp notified Software Arts that the software was not acceptable.

On February 3, 1984, Julian Lange, the new president of Software Arts, sent VisiCorp a letter to terminate the *VisiCalc* distribution agreement. He claimed that VisiCorp violated the agreement by actions such as releasing *VisiCalc IV*. That product was a combination of *VisiCalc* and *StretchCalc*, an enhancement package developed independently by Multi-soft. Software Arts asserted that, under the 1979 agreement, VisiCorp should have given Software Arts first crack at developing this—or any—new version of *VisiCalc*.

Visi On Disputes

The *Visi On* line is also a point of contention with Software Arts, which claims that VisiCorp is promoting *Visi On Calc* at the expense of *VisiCalc*'s sales. In its suit, Software Arts also claims that the *Visi On* program and the *Visi On Calc* program are new versions of the *VisiCalc* program, and that the

company should be paid the same royalties for *Visi On* sales as for *VisiCalc*. Software Arts went to court to stop VisiCorp from "marketing, selling, licensing, or distributing any products that infringe upon the *VisiCalc* trademark"—that's every product in VisiCorp's line, according to Software Arts' claim.

Software Arts was perturbed by a VisiCorp ad in the January 4, 1984, *Wall Street Journal*, which offered *VisiCalc* users a trade-in discount for purchasing *Visi On Calc*. This seemed to Software Arts like an attempt to phase out *VisiCalc*. However, *VisiCalc IV* is priced at \$250 while the software-and-mouse package that a user needs to operate *Visi On Calc* costs a total of \$740, so VisiCorp's two spreadsheets appear to be aimed at different markets.

Controversy over *Visi On* has apparently simmered between the two companies for many months. Last September, VisiCorp's suit asserted that *Visi On Calc* "was developed entirely by VisiCorp and is not derived, in any way, from the *VisiCalc* program." In addition, the new spreadsheet "operates only in conjunction with *Visi On*" and "is written in an entirely different computer programming language."

A Case of Double Visi

In this dispute the stakes are high—but they might be dropping as the legal battle drags on. According to VisiCorp, over 700,000 *VisiCalc* packages have been sold since 1979, which may establish it as the best-selling software of all time. In the past 2 years, however, *VisiCalc*'s popularity has slipped behind newer software packages, such as *1-2-3* (to say nothing of its follow-on, *Symphony*) that offer more advanced spreadsheets.

If VisiCorp and Software Arts force each other to put more effort into litigation than into programming and selling their disputed program, *VisiCalc* might lose any chance to recover its lost leadership in the software market. Added one industry watcher: Both sides lose when they go to court. ■

The Robots Are Coming!

NEW YORK—Visitors to the American Craft Museum II might think they are receiving a strange proposition when they hear "I can dance, sing, walk, talk, and flash my eye." Fear not—it is only Tot, a personal, educational (as opposed to commercial) robot programmed to greet guests, talk, tell time, and perform simple tasks.

Another of the friendlier robots—Topo—is directed by an Apple IIe. Topo has an infinite vocabulary (so the designers say), can spin its head around, and sing "Daisy" upon request. Better yet, Topo can vacuum and do other household chores.

Topo receives infrared light messages from a transmitter, and when the vacuuming (or

whatever) is done, sends messages back to the computer.

Tot and Topo are among 160 robots and robot images in "The



Say hello to Tot, created by Jerome Hamlin. ComRo, Inc. Tot can be programmed to play obstacle games.

Robot Exhibit: History, Fantasy and Reality." The exhibit traces the robot's place in history and in our imagination by display-



Topo, from Androbot, Inc., is a personal robot; an Androwagon attachment for serving drinks is optional.

ing working personal and educational robots, sculpture, prints, drawings, books, toys, and videos.

None of the robots shown in the exhibit are programmed with an IBM PC, although Robert Malone, guest curator of the exhibit, predicts that "the future is tremendous" for interfacing robots with PCs.

The exhibit will be at the American Craft Museum II, International Paper Plaza, 77 West 45th St., New York City, until May 12. After that, the robots will travel to museums throughout the country (including stops at museums in Boston, Los Angeles, Chicago, and Dallas) for the next 2½ years.

The robots demand a full-time babysitter, so there's a technician on hand. Periodically the artists or manufacturers visit their off-spring, to introduce them to exhibit visitors.

—Jane Mintzer

Pirates (continued)

they have large businesses, and they realize there's an incredible amount of money being left around. Piracy hits them on the bottom line."

"For example," Senske says, "there may be two or three 1-2-3 disks being copied for every one sold. Lotus' sales were over \$50 million last year—so that could mean the company lost over \$100 million more in sales last year."

True piracy means copying software for resale. In corporations, Cole says, piracy is really pilferage. In some cases, it may be as casual as using a manufacturer-supplied backup disk as the main program for another computer. Users may also learn to make copies and then give them to colleagues without stopping to think of the copyright violations involved. Pirated copies of disks don't come with copyright labeling or proper documentation, so the copying process perpetuates itself.

Tapping In

"Patch" programs that defeat existing copy-protection schemes on software are marketed as devices for making backup copies, Senske says, "so that makes it seem morally right to use

them." Many users complain that software protection plans make it difficult to make legitimate backup copies, so that the patch programs are necessary—and justified.

Since no software protection scheme has been completely unbreakable, software vendors depend on user cooperation. Many corporate users have already shown themselves willing to listen to manufacturers' pleas. After Lotus filed its copyright suit against Rixon, Lotus president Mitchell Kapor says, his company was flooded with calls from people reporting abuses in their organizations.

"We call the callers good samaritans, but I suppose the companies call them snitches," Kapor says.

In many cases, abuses arise when companies don't budget enough money for software. "You have to point out to the manager who has a budget to buy 5,000 PCs and allots only one-fifth of that amount for buying software that someone is pulling the wool over his eyes," says Richard Frank, chair of SuperCalc manufacturer Sorcim Corporation, and a member of the Software Protection Fund's four-man steering committee. If a PC costs \$2,500, the

software allotment would be only \$500—barely enough for 1-2-3, and certainly not enough for additional packages like dBASE II or WordStar.

Transparent Costs

Frank hopes that the fund's advertising campaign will make clear to users why software costs as much as it does. "The actual cost of making the disk is only 10 percent of our expenditure," he explains. "The users are paying for development costs, funding for new projects, and for service and support. They pay that money so that when they have a problem 3 years from now, my company will be around to help."

Cole adds, "If the rate of piracy went down, software prices might go down as well."

If the advertising and legal threats fail, software companies will return to the territory now in ADAPSO's hands—building up technical defenses against copying, and furthering legal restrictions and penalties for pirating software.

On the software protection issue, industry leaders find it more difficult to agree. "It will take years to come up with a standard," says Cole. Some companies, arguing that protec-

tion restricts users, still do not protect their software.

National legislation is another ADAPSO project, but it has the lowest priority of all the piracy-prevention activities. "Most of the laws are already in place," Cole says. "It's a matter of making sure that they keep up with the technology."

The first state legislation relating specifically to software piracy was announced during the Softcon show in New Orleans recently, and it is currently moving toward the Louisiana State Legislature. Partly written by Blanc, Gilburne, Peters, Williams, and Johnston, a Los Angeles law firm that represents Ashton-Tate, the bill sets standards for presentation and enforcement of the licensing agreements contained in most software packages. Its real purpose is to protect trade secrets by forbidding program decompilation, rather than to beef up copyright protection, however.

ADAPSO's president wishes the software fund well. "If it cuts down piracy 90 percent, we'll be very happy," Dreyer says. Frank of Sorcim agrees: "The best thing that could happen is that we'll all meet in 6 months and agree to dissolve the fund."

Micro-to-mainframe:

Before you settle for solution, ask a few serious



Choosing a micro-to-mainframe communications system is no game.

If you make the wrong choice, the consequences can be very expensive.

So before you toy around with "easy" solutions, do yourself a favor and ask some serious questions.

You might want to start with these:

Will this product support full IBM Terminal Emulation?

Make sure the system you choose offers *full* protocol emulation. It should be able to emulate remote batch and interactive IBM terminals and terminal systems.

Does the company offer a variety of products to solve my problem?

The manufacturer you select should be able to handle *any* operating environment. You should have your choice of stand-alone front-end processors, IBM PC or XT

boards, or an OEM board. And make sure the products will run on the most popular operating systems, including CP/M, MS-DOS and UNIX.

Can I get fast answers to my questions?

Insist on toll-free access to qualified service personnel before and *after* the sale. A Product Support Group should be available during your normal business day.

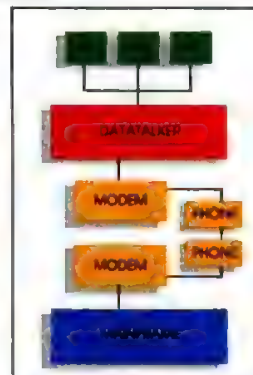
What if I need a quick analysis of a problem?

If you run into a problem, you shouldn't have to sit through a lengthy question-and-answer session over the phone. Ask if the manufacturer has a Communications Test Center that allows for

product testing over public phone lines. And find out if the product has internal diagnostics that point out problem areas right on the screen.

Suppose something goes wrong with the unit?

Be sure the company offers a service plan that includes a 30 day money-back guarantee and a 12 month warranty that includes a free replacement unit.



a simplistic questions.

What about future product development?

It's not enough for a company to solve your communications problems today. Ask about their commitment to R&D. Are they working on products you're going to need soon? If not, you might want to consider someone who is.

Who am I dealing with anyway?

In a market as volatile as this one, you need some reassurance that the people you buy from will be around to back up their products. Ask how long they've been in business. The longer, the better.

How much is all this going to cost?

There are lots of micro-to-mainframe solutions with lots of price tags. But here's a point of reference for you:

Our own DataTalker™ product line will give you all the capabilities and

services we've just described for as little as \$695. Complete.

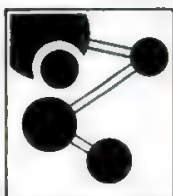
Granted, this isn't all the information you'll need to choose the right micro-to-mainframe solution. But it's a good start.

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Address: 6421 Opportunity Court		City:	
City: Minneapolis		State: MN	
Zip Code: 55343		Phone:	
Phone: (612) 938-0005		Birthdate:	
Title: V.P. Data Base Mgmt.		Spouse:	
View:	Print:	Notes:	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Search:	Change:	Return:	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The creator of Thoth and another fine Xor product, Blu Chip Portfolio Manager.			
Return to People Directory			
Return Change Labels			

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Priority:	The Thoth data base consists of the following three record types:	
<input type="checkbox"/>	1. Action Items (this is an action item record)	
	2. Note Book Items	
	3. People	
People Involved:	Each group of records can be accessed through its own dictionary. When viewing any directory, just point at a record with the little arrow and press (Z) to zoom to that record.	
	(PgDn)	
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Zoom Change Return		

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Note Item: Important Information		9/21/84
Category:	Notes:	
Important	This section can be filled with up to 838 characters of important information about projects, clients or personnel.	
Sub-Cat:		
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PRODUCT REVIEW

Be a Real Knoware Man Living in a Knoware Land

BY JAMES LANGDELL

Knoware

Knoware, Inc.
301 Vassar St.
Cambridge, MA 02139
(617) 576-3821
List Price: \$95
Requires: 128K RAM PC-
DOS 1.1 or 2.0, color/graphics
adapter.

Its ads have a message aimed straight at the heart of the trendiest phobia of the 1980s: Are you scared of computers? Beware! All you computer illiterates in business will be left behind by the whiz kids—and in school, your children will fall behind all the real kids. And what's your only hope to avoid this fate? Well, by now you've all seen the ads: Everyone knows this is *Knoware*.

My reaction to *Knoware's* claims was, "Show me!" I wanted to know if *Knoware* had "any there there," as Gertrude Stein might have asked. If I were a person—like Gertrude—who had never used a computer before, what would I find when I got to *Knoware*?

Knoware arrived in a red, white, and black box, packaged in the same style as some headache remedies. When I opened the box, I found a black envelope with a friendly "Welcome to *Knoware*" message on the front—and on the back, a scary red seal above a license agreement with lots of tiny white type.

After I worked up the courage to break the seal, I lifted the flap and found three diskettes, clearly labeled 1, 2, and 3, and a strip of paper that looked like an oversized bumper sticker. That was the manual. The instructions on it told, in 11 steps and 12 photos, every detail of how to insert a PC-DOS disk, turn on the IBM PC, put "*Knoware* disk # 1 into the left-hand drive", and enter the letter K to start the program. (Thus, *Knoware*

avoids putting a beginner through any "A:" nonsense at the start.) After that, the printed word was out of the picture—*Knoware* was on the screen, displaying everything else I needed to know.

I put *Knoware* to another test. I handed the box to a computer novice, aimed her at an IBM PC that had the required color graphics, and watched to see how far she could get with *Knoware*. That wasn't very far on her first attempt—but through no fault of her own. She followed all the instructions correctly, but when the program started up, scraps of plaid patterns flowed across the color screen and snatches of text appeared in odd locations on the monochrome screen attached to the same PC. Meanwhile, the trumpet fanfare from *Masterpiece Theater* repeated over and over on the PC's speaker, with no hint of how to stop the music without unplugging the computer.

The problem was that *Knoware's* easy-to-start procedure didn't take into account the possibility of a PC equipped with more equipment than the minimum required by the program. I found that *Knoware* could be used on our two-monitor system if I ran a routine from PC-DOS that switched control over to the color monitor before I ran *Knoware*. (The listing for that routine was published under the heading "Color Switch" in "User-to-User," PC, Volume 1 Number 4.)

Playing on the Job

Once you get it running, you'll find *Knoware* presents itself as an adventure game. It's set in the business world and offers you the twin goals of becoming a millionaire and chairman of the board after rising shrewdly through the ranks. You begin with just \$500 and a

job as a mail clerk, so you have to move quickly and adroitly to achieve your goals within 60 game-years.

In each job of your simulated career, you have to solve problems that lead you to learn and practice new computer skills. In the mailroom, you fight crime with BASIC graphics commands. After being promoted to accountant, you use a BASIC program to compare investments, and learn how to input data and interpret results. On your way to the top, you learn how to modify that BASIC investment program, then get a taste of using word processor, spreadsheet, and database manager programs.

Once you become president of the company, you are presented with more challenging tasks that you must solve using a combination of different programs and data files.

Along the way, each time you're promoted to a new job, *Knoware* rewards you with a cash bonus and a graphics and sound extravaganza. Most of the displays and tunes have patriotic themes. Red, white, and blue are popular colors in *Knoware*.

As a game, *Knoware* is flashy, and easily holds your attention. Frequent messages spur you on, reminding you what remains to be done to win the game, and how little time you have left to make it big. The stress of competition is intended to heighten your attention, and make your learning experience more intense and memorable.

I feel that the game element in *Knoware* sometimes overwhelms its educational value.

For example, the program's excellent tutorials are available at any time you decide to press the question mark (?) key for help. The game, however, doesn't let you know whether or not the time clock keeps running when you pause for a lesson. If you get caught up in the excitement of the game, you might be afraid to take the extra time to learn something.

Have no fear! I found that game-time stops during tutorials, so there's no penalty for getting an education.

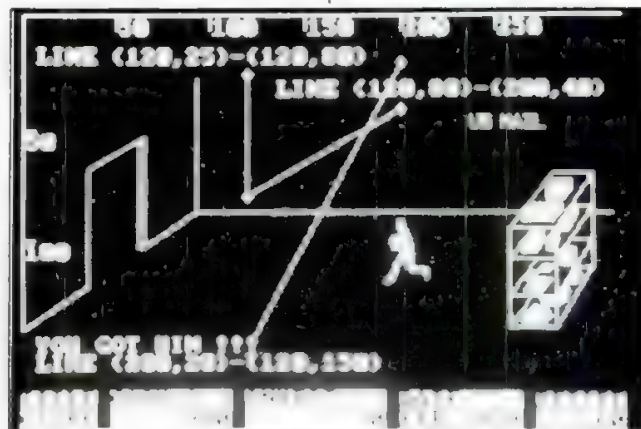
In the game, you are aided by two advisers, Professor Madnick and Professor Donovan, named after the MIT faculty members who developed the *Knoware* program. You can ask Madnick for a free tutorial at any time, and he'll take you step-by-step through problems similar to the ones facing you in the game. You can ask Donovan to give you the actual answer to a problem—but he'll charge you plenty for it.

When you make mistakes while playing the game, messages appear on the screen to make clear what you did wrong, but they don't give you the solution outright. For example, if you write a line in BASIC that contains several mistakes, the messages point out only one problem at a time, giving you a chance to notice and correct the additional errors on your own.

Real Application

It took me about 90 minutes to go completely through *Knoware* (I won the game, by the way). A session can take even

(continued)



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Knoware (continued)

longer if you seek more help from the tutorials, solve more of the president's tasks, or just stick around to rack up the big bucks before retiring.

The programs you run while playing *Knoware* aren't just mock pieces of software. The third disk contains a word processor, spreadsheet, database manager, and other programs that can function outside of the game. They are, however, somewhat limited (for example, the *Knowcalc* spreadsheet is only 25-by-25 cells in size). In addition to these workaday applications, *Knoware* provides amusements such as a bio-rhythm calculator and a "mouse races" game. (Given the corporate setting, I think a "rat race" would have been more appropriate.)

After you become chairman of the board and win the game, *Knoware* tells you how to bypass the game in the future to use the third disk's set of programs as you wish. Unfortunately, it still takes about 6 minutes to load up *Knoware* and step through the initial set of screens.

Knoware is an unusual package of software that blends elements of game, educational, and applications programs. At \$95, *Knoware* is more expensive than any other PC game, most of the introducing-the-PC tutorials, and some of bundled packages (such as Friendly Soft's) of simple but useful applications programs. But the whole of *Knoware* is greater than the sum of its parts.

I'm impressed by how well *Knoware's* design saves the PC from being fazed by a novice user's often unpredictable responses—and how it protects users from fear and boredom while playing and learning. It would be an excellent package to set as bait in an office where several people need to become familiar with the PC. Although there's much more to learn about the PC and its applications programs than *Knoware* teaches, its combination of ingredients give a playful first impression of working with a computer and a tasty sample of several flavors of software. ■

News from Knoware

Jeb Walker of Knoware tells how computers teach—and what people need to learn

BY JAMES LANGDELL

Where do you go from *Knoware*? And how did you get there? Those questions were answered in a recent talk with Jeb Walker, Knoware, Inc.'s vice president of marketing. Walker had 15 years in IBM's Data Processing Division and a year with VisiCorp before coming to Knoware.

WALKER: The inventors of *Knoware* are John Donovan and Stuart Madnick, professors at MIT and the Sloan School. They found that people learn more and learn better when it's an enjoyable experience—when people operate at their own pace and work in a nonthreatening environment. Out of all the professors' experiences came the idea that a computer ought to be able to teach about itself. So, they wrote a program that does the teaching in an entertaining format and offers applications you can return to for practice.

PC: *In developing Knoware, you walked a fine line between making the game challenging but not overwhelming—not like Space Invaders where you get killed in 10 seconds the first dozen times you play. And you had to keep the training well paced at the same time.*

WALKER: I hate the word *game* because the industry thinks in terms of zapping spaceships. That's not what we're about. We've wrestled with finding the right word. *Adventure* seems the most suitable, but we're stretching it to call a promotion from Mail Clerk to Accountant an *adventure*.

PC: *How did you test Knoware?*
WALKER: We tried it with about half a dozen different groups. One of these was the Sloan School summer program with about 2,000 business executives, middle-level to managers, from all over the country. Another group had about 600 AT&T employees in the Cambridge Training Program.

We determined their skill level before they were run through *Knoware*—if that's the right way to put it. And afterwards, we questioned them not only about general computer literacy, but to find out which specific applications they believed would help them in business.

They felt word processing would be the most useful application. But spreadsheets are



another matter—that's the most widely used application, but it is the most alien term to people who don't work with PCs.

There were some 2,500 odd people in these two groups, a broad enough cross section to help us make final decisions about the first *Knoware* product because it was aimed at the world of white-collar business users. Somehow this term usually gets translated as "executive," but that's not true.

Even though the top executives probably are most afraid of using personal computers, they aren't the group where the most productivity—and most new users—will come from. We're aiming at people in the business context who're not at the top of the line.

PC: *What are some future Knoware products?*

WALKER: First, we'll have a version for adults in the home. Instead of earning promotions, the goal in this adventure will be to acquire, build, and maintain a house. You'll learn to use the same set of applications programs, but with domestic exam-

ples. You calculate mortgage and interest rates or plan budgets. You've got to keep in mind what your salary is—or what your family's salaries are.

Another version will be for youngsters. This will be a true adventure game where your goals are to meet the Wizard, enter the castle, and join the court. The teaching methodology is the same—just in a fantasy format. We have the players draw with Logo instead of using BASIC programs to make bar and pie charts. Of course, a youngster could be anyone....

We also plan programs that add to people's professional skills. These won't just teach how to run accounting software, but accounting itself. I've asked big companies what they want our programs to teach, and accounting's been the number one request.

Companies also want training programs that are industry specific. Big insurance companies are buying PCs by the thousands to improve productivity in that labor-intensive industry. And they want to teach workers to do more things. Get away from having a 26-year-old start as an actuary, then after he dies some 50 years later, that's all he's done. If we create a *Knoware* insurance adventure, we're thinking of calling it *Know-Fault*.

My wife and I joke about starting a product line called *KNOWTV*. I told my 15-year-old that he may not ever watch TV again as long as he lives; perhaps that will cut his TV time down by 50 percent or so. But it would be grand to teach kids something worthwhile instead of babysitting them with soap operas.

I'm impressed by the Writing to Read project, which uses PCs. Wouldn't it be wonderful to do the same thing in the home? You could teach youngsters—even in the South Bronx—to cope better with the language. But now, even Yale University needs to run a remedial reading program in its graduate school. The schools should prove this out—if you can teach computer literacy with a computer, you can teach anything. ■

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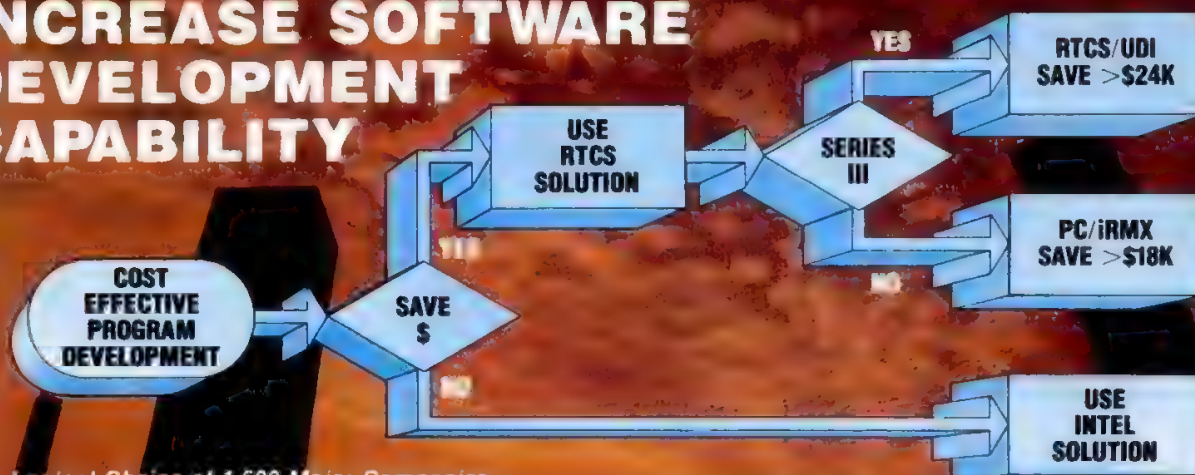
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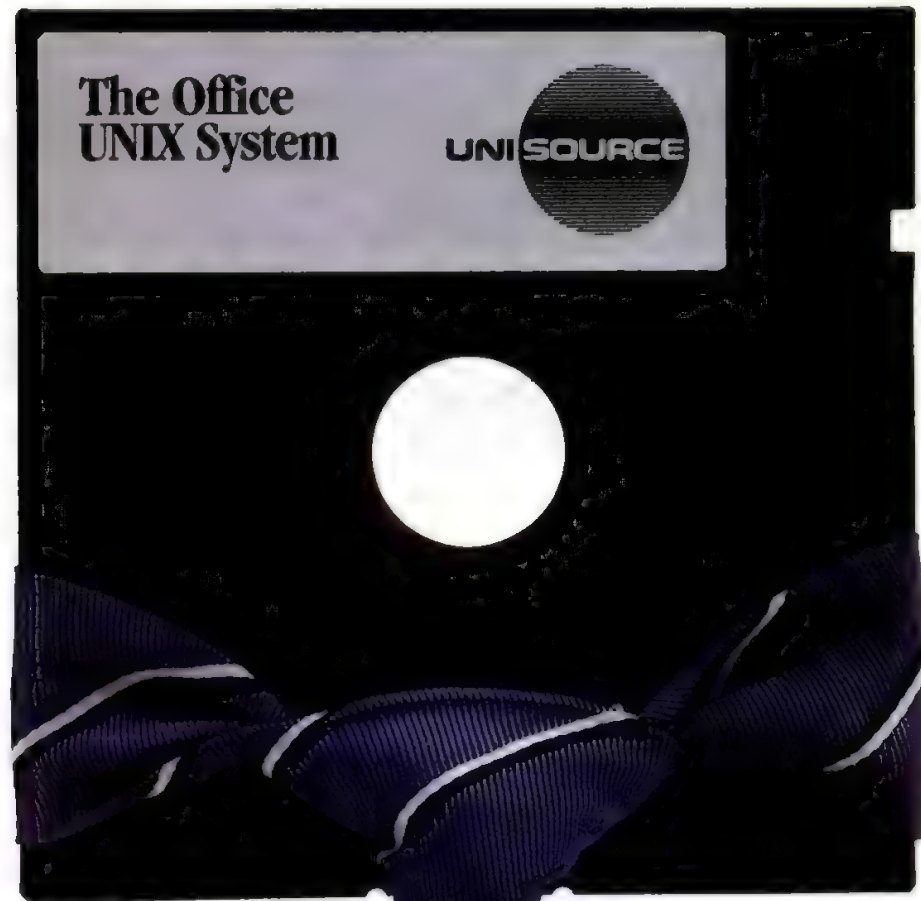
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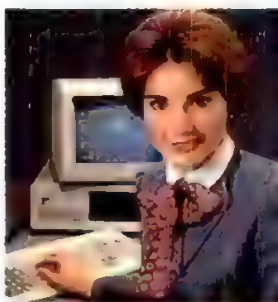
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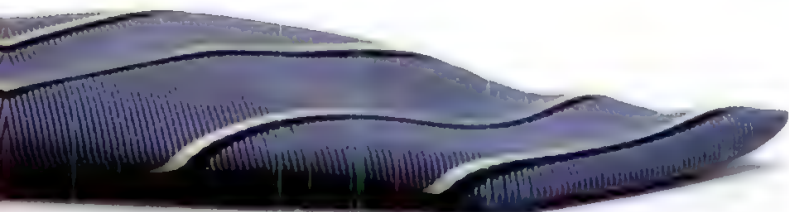
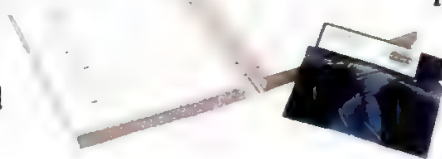
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CIRCLE 113 ON READER SERVICE CARD

Stylish Graphics Lead PC Parade

Sord's lap size, Zenith's compatibility, and Mindset's graphics mark new models

The Mindset Personal Computer, a flashy new graphics-oriented, MS-DOS-compatible model from a California start-up outfit, has stolen the show in this spring's personal computer parade. Sord Computer of America and Zenith Data Systems also displayed new wares, but neither company made any significant departures from current computer fashions in the way of adding unprecedented capabilities.

Mindset Corporation was founded 2 years ago in Sunnyvale, California by Roger Badertscher, formerly the president of Atari's home computer division. Like Atari's computers, the Mindset PC's strongest suits are speedy, sophisticated graphics and color capabilities. The new twists are MS-DOS-level compatibility—Mindset claims that its machine runs "most" programs written for the PC—and plans for a strong push into the office computer market.

The Mindset PC uses the Intel 80186 chip instead of IBM's standard 8088 microprocessor. The computer's clock runs at 6 megahertz, 25 percent faster than the 4.77-megahertz industry standard. In addition, Mindset packs two VLSI (Very Large Scale Integration) coprocessors, one for graphics and one for the video display. The graphics processor can produce animated graphics, while the video chip can command 16 colors at a time from a 512-shade palette at 320 X 200-pixel resolution. When only two colors are used, Mindset's screen resolution jumps to a full 640-by-400 pixels.

Double Bus

To speed its graphics, Mindset developed a two-bus architecture: The 80186 system chip

works independently of the graphics and video coprocessors. Once a screen is complete, the graphics processor loads data into a frame buffer, which can then be accessed by the chip that controls video output. While the video component does its work, users can continue to run programs and create new designs.

Unlike most office-oriented computers, but like many game-oriented machines, Mindset can be hooked to either a TV set or a

color monitor. Like IBM's \$1,300 version of PCjr, the Mindset PC comes without any sort of monitor. Mindset, which says it will offer a carrying case for its 22-pound system unit and keyboard combination, bills the computer as a "transportable." No one, however, is making any claims for carrying the TV under the other arm.

Mindset makes a significant step forward in personal computer graphics capabilities at a relatively low cost, analysts say, but no one is sure how much demand for graphics exists in the corporations that Mindset hopes will be its main market.

The base price for the Mindset PC system unit and keyboard is \$1,099. With two disk drives and 256K RAM, Mindset sells for \$2,398. Options are available at extra cost include a joystick, mouse, modems, and serial and parallel interfaces.



Sord's IS-11 "Consultant" brings integrated software to a lap-sized machine



Zenith's Z-160 portable: the small member in a PC-compatible family

Sord Consultant

Sord Computer of America's new delivery is a 4.6-pound, lap-sized computer, the IS-11. Informally called Consultant, the Los Angeles company's new model has a four-part integrated software package built into memory, and a built-in micro-cassette (similar to the Workslate from Convergent Technologies). The program performs mathematical calculations, word processing, communications via an RS-232 interface, and data handling.

The data handling mode runs spreadsheet, graphics, search, sort, and windowing (or should we say peephole?) functions on an 8 x 40-column display screen.

Sord plans to offer a BASIC programming module as an option, and the company hopes that third-party developers will introduce software applications programs in 64K ROM-packs.

Like Radio Shack's Model 100, Consultant will have its own operating system, which will not be PC compatible. The standard 32K RAM memory can be expanded to 64K, but users can store 128K of data onto minicassettes in the computer's built-in tape recorder. A 3½-inch-floppy disk drive is optional.

Sord's Consultant, which began limited shipments in April, retails for \$995.

Zenith Versions

IBM compatibility is also the new buzzword at Zenith Data Systems. The Glenview, Illinois company recently introduced two new Zenith machines: a Z-150 desktop unit and a Z-160 portable.

The 30-pound Z-160 portable comes with either one (\$2,799) or two floppy drives. The Z-150 desktop model costs from \$2,699 for a one floppy drive configuration to \$4,799 for the version with a 10-MB hard disk and a floppy drive. RAM can be expanded from 128K to 640K.

Zenith promises that the machines, manufactured by Alps Electric of Japan, are highly compatible with the IBM PC. The desktop model is available immediately; the portable goes on sale in May.

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- File lock out
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 - Call Forwarding
 - Length Of Call Indicator
 - Directory Support - with unlimited number storage
 - Message Support - either leave or obtain messages. Receive messages remotely
 - The modem board, with a handset, substitutes for a telephone

MODEM

- Gateway to other networks
- Electronic mail
- Device sharing
- Remote job execution
- File lock out
- Password protection
- 300 to 1200 baud modems available
- Data in network can be obtained by decoding touch-tone sequence or through voice recognition prompt
- Respond to remote terminal
- Access dictating systems on network. Control them by touch-tone decoding
- Programs or calculator can be used remotely. The touch-tone keypad can be used to provide numeric input to programs or the calculator from a remote site (programs are loaded by decoding touch-tone sequences)

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- Voice mail
- Voice annotated text
- Voice messages

VOICE RECOGNITION

- Transparent keyboard. Speak instead of type

SECRETARY \$1695¹

- Ethernet Link
- Ethernet Companion
- ELAN Software



EXECUTIVE \$2995¹

- Ethernet Link
- Ethernet Companion
- Modem (300 Baud)²
- Voice Recognition
- Microphone
- ELAN Software



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The network employs the industry-standard high speed Ethernet protocol, which permits a number of IBM PC's to be linked together by ordinary thin coaxial cable. In addition to his own computer's power, a user has the availability of other devices which are also attached to the cable - such as various printers, large disks, etc.

All versions of ELAN include an Ethernet interface and equipment to convert voice into data and back again. This enables one to give and receive spoken messages from any location. The SECRETARY is the basic system with these features.

¹With 1st MATE, 2nd MATE, or 3rd MATE in Station

²Option: 1200 Baud Modem

*ELAN (formerly ComNet)

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- Clock/Calendar - either visual or audible
- Calculator - either visual or audible
- Voice Management - oversees voice mail, voice message and voice annotated text operations

These software packages can be operated through voice recognition with voice output, through the telephone keypad with voice output or through the IBM PC keyboard.

NETWORK FOR THE IBM PC

The MANAGER system adds a modem which can turn the PC into a telephone if a separate handset is added. The modem enables the MANAGER to receive unattended voice and data from any telephone in the U.S. or Canada. The MANAGER can accept commands by decoding the tones in the telephone keypad.

The EXECUTIVE is the most complete implementation of ELAN, adding computer recognition of spoken commands. An executive might phone the PC to leave or retrieve messages or request specific information. The PC, in a spoken voice, can request the user's access code or offer a list of options the user can select. The EXECUTIVE can then key in answers or commands with the phone's tone dialing buttons, or may simply speak his response to the computer.



MANAGER \$1995¹

- Ethernet Link
- Ethernet Companion
- Modem (300 Baud)²
- ELAN Software

HARDWARE

ETHERNET LINK

Permits communications between computers at extremely high speeds (10 Mbits per second). The transmission mode is through single video coaxial cable with easy-to-use BNC connectors.

ETHERNET COMPANION

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MODEM

103 (300 Baud)	\$295
212A (1200 Baud)	\$695

- 103 (300 Baud) or 212A (300 or 1200 Baud)
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- Dual tone DTMF receiver (decodes touch tones)
- Auxiliary voice circuit
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- Can replace telephone with the addition of a handset

VOICE RECOGNITION	\$995
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CIRCLE 262 ON READER SERVICE CARD

Commodore Adds Hyperion, Chips

Intel pact and Hyperion's MS-DOS portable lead home computer maker into offices

BY KAREN COOK

PHILADELPHIA — Commodore International, Ltd., the leader of the U.S. home computer market and a long-time holdout against the MS-DOS standard, is set to make a major move into PC-compatible markets around the world. "Commodore could conceivably become the major supplier of low-cost PC-compatibles, while other companies may be forced to merge or go out of business," says Doug Cayne, microcomputer industry securities analyst

at the Stamford, Connecticut-based Gartner Group.

Commodore accomplished its radical shift of position virtually overnight—with two bold strokes of a pen. With the first, Commodore acquired licenses for PC-compatible technology used in the Montreal-based Bytec-Comterm company's Hyperion portable. In effect, Commodore bought itself a computer.

Next, the canny Philadelphia-based company con-

vinced Intel Corp.—partly owned by IBM—to make Commodore a second-source supplier for the Intel 8088 chip. Once production of the new chip gets underway, Commodore should be able to mass-produce its new Hyperion models at low cost, without any risk of the 8088 microprocessor shortages that have plagued other manufacturers.

Low Cost Strategy

Unlike IBM, Commodore manufactures almost all of its computer's components, including monitors and disk drives, in its own plants. As a result, the company has been able to keep prices low enough to undercut many other manufacturers in the home computer market.

"Getting the license to produce the Intel 8088 is a major coup for Commodore," comments Cayne of the Gartner Group. "Commodore wouldn't

have gotten heavily involved in PC-compatibles unless it could assure itself of an adequate supply of chips at low cost. This is the way to get them."

European Push

Commodore planned to introduce its first PC-compatible model at a trade fair in Hanover, Germany. The company began hand-assembling Hyperion kits sent down from Canada almost as soon as the Bytec-Comterm licensing agreement was signed, Cayne says.

Commodore is particularly rushing to meet the demand for IBM compatibles in Europe, where the company is well established and has a larger market share than IBM. If the portable is as successful as abroad, Commodore will introduce it in the U.S. in the late fall, Cayne predicts.

Commodore will make no comment on the terms of the two contracts. ■

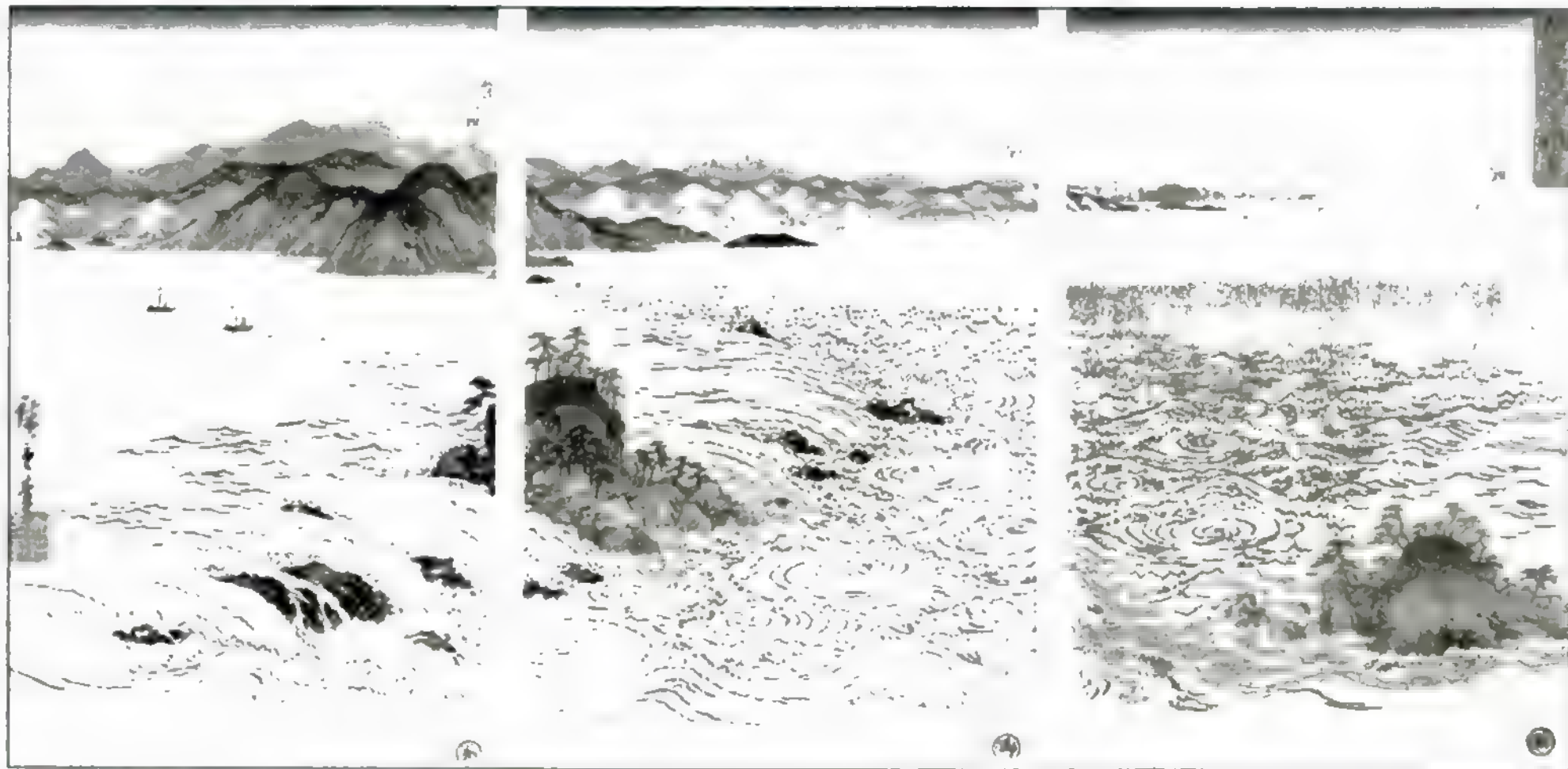
IBM's New Japanese Display

For all their commercial rivalry, Japan and IBM are far from not appreciating each other. Some proof can be found at a current exhibit by the IBM Gallery of Science and Art in New York City which presents woodblock prints by Hiroshige, the 19th century Japanese artist.

Hiroshige (1797-1858) was a leading artist of the *ukiyo-e* school, who sought to capture "pictures of the fleeting or floating world" in color woodblock prints. His landscapes feature snow, rain, mist, and moonlight.

The woodblock technique used by Hiroshige crossed over from west to east. *Ukiyo-e* was a new style created by 18th century Japanese artists under the influence of Dutch engravings. The favor was returned from east to west, since Whistler was influenced by Hiroshige's works.

This exhibit runs April 10 to May 19 at the gallery, located in the lower level of IBM's Manhattan office at Madison Avenue and 56th Street. Admission is free, and the gallery is open 11 a.m. to 6 p.m., Tuesday through Friday, and on Saturday from 11 a.m. to 5 p.m. ■



"View of the Rapids of Awa at Naruto" by Hiroshige.

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CIRCLE 215 ON READER SERVICE CARD

Firms Hitch Mouse, Training to 1-2-3

MicroMentor throws out widgets to train corporate executives in management terms on the PC

BY CONNIE WINKLER

NEW YORK—PCs ought to serve as more than \$5,000 paperweights.

Unfortunately, many users don't know how to apply the desk ornaments to their actual at-hand business problems, so many PC's gather dust.

Inventive companies now are developing clever ways to make these PC users more productive—hybrid products that piggyback on the popular 1-2-3 from Lotus Development Corporation. Examples include a training package from MicroMentor in Belmont, Massachusetts, and a mouse customized for Lotus products from Mouse Systems, Inc., in Santa Clara, California.

The Mouse Systems Plan, according to president Stephen Kirsch, is to make the existing interfaces to 1-2-3 and Lotus' new *Symphony* easier to use. Mouse Systems would develop pop-up menus, perhaps directing users to windows, and additional graphics—all of which could be controlled by the mouse.

Mouse Systems is now negotiating with Lotus while studying a beta version of *Symphony*, said Kirsch, who invented the Mouse Systems mouse. Their \$295 PC mouse (hardware and software) already can be used to control the cursor on Lotus 1-2-3. (And, in fact at least one dealer, Computerworks, in Westport, Connecticut, automatically bundles a mouse into a system so that the 1-2-3 user, for instance, can work the numeric keypad with one hand and the mouse cursor control with the other.)

Manager Training

MicroMentor also hitches onto 1-2-3, customizing it to the specific needs of senior line managers. Instead of simply learning about PCs, MicroMentor trainees learn about PCs through their jobs—with 1-2-3

as the tool in between.

The Harvard Business School approach is not new to MicroMentor president and founder Eric E. Vogt. A former B-school professor, he designed courses there and was also a management strategy consultant with the fast-track Boston Consulting Group. As an independent consultant in the early 1980s, Vogt routinely used personal computers to organize data, create strategic scenarios, and present findings and recommendations to his clients.

Not surprisingly, his clients

asked, "How do you do that?"

Through the case study method, course participants use 1-2-3 to tackle the daily problems of their jobs.

"What sets us apart from other training services is the customized curricula, which demonstrates the problem-solving applications of software once the students are comfortable with the hardware. We don't deal with widget product at Blitz Manufacturing," explains Vogt. "We ask General Electric executives, for example, to analyze the impact of a

strengthening yen currency upon GE room air conditioner costs and sales volume."

Agents for Connecticut Mutual Life enthusiastically calculate life insurance options and present the results graphically to potential customers.

Case by Case

MicroMentor's case study approach has proven so popular with large corporations that the company is experiencing gross margin profits of about 70 percent. Launched with private seed capital of \$60,000, MicroMentor now has annual sales of about \$1 million. More than 500 managers have taken the course.

Before presenting the class, MicroMentor instructors research the companies and interview key executives to gain an understanding of its industry and the challenges its management faces.

Then 15-minute modules are either developed or assembled to complete the 3-day training. This customized training costs \$300 to \$400 per student, depending on the company and industry involved, Vogt said.

PC Fleet

MicroMentor has seven instructors and a mixed fleet of IBM PCs and Compaq portables. To market his concepts to top executives initially, Vogt uses a Grid Compass to demonstrate his training approach—and, predictably wow potential clients.

In the classroom typically at the clients' locations the real challenge is to capture the students interest quickly, explains Vogt. Students work two to a PC, which actually makes learning three times as fast. The students are able to brainstorm together to solve problems, he explains. Class size averages about 24 students, and several technical assistants, in addition to the instructor, are on hand. ■

A Computer Camp Counselor



What a problem! Summer's coming on and it's camping time for kids. But your children aren't Scouts, so Scout camp's out. And they don't play clarinet or tennis, so they couldn't cut it at a music or sports camp. And they're already the right weight, so a slim-down camp wouldn't feed them well enough for the price. So where else can children go to get out of the house for a few hot weeks?

Here's an idea for 1984. How about sending them to a computer camp? Everyone ought to go to camp, and everybody needs computers, right? But what's a computer camp and where are they, anyway?

This year, Verbatim Corporation took a break from making disks, and got together with the American Camping Association to produce *Camps 'n Computers*, a guide listing over 100 computer camps. There's details about each camp, including the quantity and type of computer.

If there's several brands of computers at a camp, this guide will tell you. You'd have to call up the camp, however, to find which color squad your child might be on—the Apple Rainbows or the Big Blue Tramps.

The booklet is available by writing to *Camps 'n Computers*, 4966 El Camino Real, Ste. 228, Los Altos, CA 94022. Please send \$1 for postage and handling and make checks payable to Verbatim. ■



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Play Is the Thing In Hacker Drama

Theater of, by, and not just for computer lovers hits off-Broadway

BY ROBIN RASKIN

Artificial Intelligence has always been a lively subject, but never before has it inspired lively theatrical entertainment. *Hackers* is not the sequel to the Lizzie Borden Story, rather it's a new comedy by Michael Eisenberg, an MIT graduate student in computer science. *Hackers* is a story about those brilliant, quirky, nocturnal young people who inhabit college computer centers across the country. This spring, *Hackers* was playing off-Broadway at the Manhattan Punch Line Theatre in New York City, and is expected to be picked up by university drama groups.

The play is set in the institutional-grey basement of a college computer center. After a few moments of listening to its protagonist, the irascible genius Martin DeKoven, the audience can be assured that the man/machine interface is scheduled for a verbal beating. What transpires in the subterranean computer center of a small New England college is entertaining theater and an insightful glimpse at the potential of the human-computer conjunction.

Woody Allen as Programmer

The cast of characters radiates the hacker mystique: There's Martin, a slouching, disheveled disciple of AI. For over 2 years he's been pouring his life experiences into a program designed to capture his soul. In an Orwellian sense, success is failure because his own personality is suspect if his program succeeds.

There's K.J., a lonesome computer sage who resides in the basement, alternating between his terminal, the fast-food machines, and the over-

night couch. He is obsessively programming the ultimate computer adventure game—a detailed re-creation of his life. In one of *Hackers'* best scenes, K.J. changes the parameters of the program so that his first sexual encounter works out better.

There's Mary, black and beautiful, but burdened by a chip on her shoulder as heavy as any in her LISP machine. She is programming the computer to play one helluva chess game. Mary pursues fame, fortune, and the defeat of every pawn-calculating male.

Finally there's Chris, the hacker-to-be. He's a high school senior whose part-time job as Martin's typist transforms him into a dedicated hacker "groupie." Chris only has to hear the word RAM, and his adolescent juices start pumping. His dream is to be initiated into the fraternity of computing.

On-line Story

Four characters gather in the early hours of the morning and engage in some weird symbiotic ritual with their machines. For those who have never known the delightful agonies of a night-long computer session, there's a compelling attraction between keyboard and fingers, display screens and bodies that playwright Eisenberg captures on the stage. Even computer-provincial playgoers burst into laughter when Martin accuses Mary of being so simpleminded that "he could program her on a Commodore 64!"

The play, like any good "program," evolves on many levels. LISP is the language the cast hacks away at; it is the language of artificial intelligence. But whether you've programmed in LISP or BASIC,

whether you've ever inserted a floppy disk into a drive or dropped a quarter into a video game slot, you cannot help but walk away from this play knowing something big is brewing. Computer jargon is now embedded in the English language. The basement computerists are infiltrating the world outside, and the hackers are everywhere. Now we even have plays about them!

Equally at home in the worlds

of drama and computer science, Michael Eisenberg has written a number of plays that have been professionally produced. One is a musical based on Karel Capek's *R.U.R.*—the play that introduced the word *robot*. The 27-year-old Eisenberg's ardent attraction to computers is recent—his major at Columbia University was chemistry. After working as a chemist, he got a job as a computer programmer (continued)

For Best PC Buys, Summer in Europe

IBM uses PC price cuts to hit continental competition and boost lagging sales

BY SEAN HALLAHAN

LONDON—IBM has slashed the European prices of its personal computers by up to 20 percent, making it—for the first time—cheaper to buy in Europe than in the United States.

The largest price cut is on the PC, about 20 percent in most European countries. The XT, however, has been reduced by only 7 percent. The minimum configuration PC, with 64K RAM and one 320K disk drive, retails in the United Kingdom for \$1,686 (at the current exchange rate), about \$25 lower than the price in the United States.

The 128K PC with two 320K disk drives and 9 monochrome display retails for \$2,560, just over 20 percent cheaper than on the other side of the Atlantic. The 10 percent price cuts on the XT leave that machine more expensive here than in the United States, but only by about 4 percent.

The 200 IBM authorized dealers in the United Kingdom see the price cuts as an effort to stimulate sales of the PC here, which, according to Tim Keen of Keen Computers, are "recognized as being sluggish compared to the rest of the world."

IBM's official explanation for

the move is that it "reflects improvements in manufacturing as a result of the full commissioning of the European manufacturing plant in Greenock, Scotland." Many dealers concur, arguing that the PC is being produced cheaper in Britain than at the Boca Raton plant in the United States.

The price cuts are bound to hurt ACT, which sells the Sirius and Apricot machines. IBM's major British competitor.

There are 10,000 to 15,000 PCs installed in Great Britain and IBM is predicted to sell another 40,000 this year.

In Europe, however, Big Blue's name does not carry the same weight as it does in the United States, and PC sales are generally acknowledged to be poor, particularly in Germany. The PC divisions throughout Europe have been recently reorganized and the management team beefed up to counteract IBM's late entry into the European microcomputer marketplace. In addition, IBM is planning a huge advertising campaign, to be aimed at the small business user. ■

Sean Hallahan is the editor of PC Magazine in the United Kingdom.

Hacker (continued)

with a medical research project in order to free up some time for writing plays. He was bewitched by the computer's potential.

"Computers are compelling," admits Eisenberg. "I admire hackers terribly. They are brilliant people having fun." When he's not writing plays, Eisenberg works in MIT's Educa-

tional Computing Lab with a new language called BOXER.

Comments about the play are appreciated, and Eisenberg awaits input via the DUCK and MIT-OZ networks.

Whether or not you're a hacker...if you like to laugh and you like to think, especially if you like to do the two in unison, you'll like *Hackers*. Watch for it. ■

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
May 3-6	Personal Computer Userfest	Featuring Apple and IBM PC computers and compatibles.	O'Hare Exposition Center Chicago, IL	Northeast Expositions 822 Boylston St. Chestnut Hill, MA 02167 (800) 343-2222 (617) 739-2000
May 5	Microcomputers in the Corporate Environment	Seminars on policy, administration, uses, and abuses of micros in the business community.	New York University Club New York, NY	Association for Women in Computing Greater New York Chapter P.O. Box 2293 Grand Central Station New York, NY 10163 (212) 244-4270
May 12-14	SOFTWEST '84	Hardware and software for Apple and IBM PC computers.	Regency Hotel and Conference Center Denver, CO	Colorado Conference Group 3312 Cripple Creek Suite C Boulder, CO 80303 (303) 499-1034
May 15-17	Criminal Justice Systems Conference	Criminal justice applications.	Virginia Commonwealth University Richmond, VA	Virginia Department of Criminal Justice Services 805 E. Broad St. Richmond, VA 23219 (804) 786-4000
May 22-25	COMDEX/Spring	Hardware, software, and accessories for dealers and retailers.	Georgia World Congress, Atlanta Apparel Mart, and Atlanta Merchandise Mart Atlanta, GA	The Interface Group 300 First Ave. Needham, MA 02194 (800) 325-3330 (617) 449-6000
May 22-26	MICRO-EXPO	International hardware and software trade show.	Palais des Congres Paris, France	MICRO-EXPO 2344 Sixth St. Berkeley, CA 94710 (800) 848-8233 (415) 227-2346
June 12-14	Advanced Manufacturing Systems Exposition & Conference	Information systems and automated production systems.	McCormick Place Chicago, IL	AMS 84 708 Third Ave. New York, NY 10017
June 14-17	Cincinnati Computer Showcase Expo	Hardware and software.	Cincinnati Civic Center Cincinnati, OH	The Interface Group See above
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PRODUCT REVIEW

Throw Your Hat, Or Your Candidate's Into PC and Win at Nomination Game

BY CHARLES BERMANT

Nomination

The Brady Company
Bowie, Maryland 20715
(301) 262-6300

List Price: \$29.95

Requires: 128K RAM, one disk drive.

If the brouhaha and television hoopla over this year's presidential election leave you choiceless, there's a timely computer game to help you pick your candidate....maybe.

As children we are told that in America anyone can grow up to become president, which makes many of us anxious for the time when we'll turn 35 and stake our natural claim to the nation's highest office. Then reality sinks in and we find that the presidency is not only the prize of fierce competition, but also far less than an equal-opportunity job; it takes a lot of time, power, ego, and money to even get close.

For players of a new computer game, *Nomination*, developed exclusively for the PC and its compatibles, a fantasy presidency is at least within reach. Here, any effective armchair politician can be pitted against both the real candidates and other players, easily wrapping up either party's nomination in less than an hour's time.

Real Candidates

Although the game was rushed to market to be in time for the advent of the primary season, the manufacturers claim that *Nomination* is an educational exercise that will sustain its value after the election. Given the nature of modern politics, they add, most of the names won't change until 1992.

On the Democratic side, you compete against Walter Mondale, and Senators John Glenn, Alan Cranston, and Gary Hart, while Republicans battle Ronald Reagan, Representative Jack Kemp, and Senators Robert

Dole and Howard Baker. Right off the bat there are clear differences between the game and real life; the Democratic field, at this writing, is actually twice as large, while there is only one Republican contender.

In addition, *Nomination* doesn't give leading candidates the heavy advantages they enjoy in real life. The two frontrunners lose as often as they win. The Republican program, in fact, seems to favor Kemp.

Looks and Issues

As the game begins, you are

game's most enjoyable part, an engaging test of political savvy. Players are given only 8 seconds to scan each question and its five programmed responses. A quick answer, even before the prompt, gives you extra points during the instant analysis, which rates your response as anywhere from "superb and should get him more votes" to "the babbling of a small child."

Fund allocation, on the other hand, soon becomes tedious. This boredom can't help but defeat the game's purpose, because fund allocation is its most



first prompted to create a candidate profile. Questions about height, appearance, and personality precede those about issues. You prepare a "position paper" by stating your opinion on a variety of current issues in terms of a 0 to 5 rating.

Nomination has five parts. Fund allocation, press conferences, snap political decisions, and primary contests are part of each segment. Money is dispensed in four categories, TV, radio, personnel and literature; the cash available depends on current vote totals. For this reason it's difficult to recover from a heavy early primary loss.

Political Smarts

Press conferences are the

crucial step.

Players quickly learn to take positions that will be popular rather than those that reflect their personal political stands. Initially, I played as myself, a slightly left-leaning Democrat, but met with little success. My first win came in the Republican column, when I affected the most outrageously right-wing stance I could think of.

A Party Party

Nomination can be a lot of fun to play, especially in a group. But as a tool for learning about political realities, *Nomination* is nearly a total washout.

Some of the game's problems are simply factual—there is no Iowa primary—but slight twists

of fact could be forgiven if the game was at least politically authentic. Sadly, it suffers from a misguided and fractured orientation.

In reality, New Hampshire is a kingmaker state but in *Nomination* it only represents 22 meager delegates. In the game, it's smarter to just skip New Hampshire entirely and allocate all your money to, say, Georgia radio. The game's labor endorsements are, for some reason, made after important labor state primaries. And during one round, liberal Alan Cranston won both the Alabama primary and the endorsement of the National Rifle Association.

On two occasions, both my opponent and myself were offered—and accepted—George Wallace's support. This incident is strange enough, but then when Wallace shows up on the Republican side offering the same deal, it becomes obvious that there's a bug in the program.

Finally, when one *Nomination* primary total finds us with fewer delegates than we had one round before, we are convinced that either dirty politics or bad programming is a modern reality.

Tough Sledding

Nomination gives an option of five game levels, the highest of which is supposedly a "bare knuckles fight." But these differences seem to be buried in the recesses of the program, because level 5 seems much the same as level 1. When we played with more than one player, we were never given the chance to choose a level.

Nomination can be challenging, and playing it for the first time is always charming. Even with all its faults, it retains an endearing, unpredictable element. But it suffers from a severe identity crisis: A computer game should be either entertaining or educational. *Nomination* is not quite enough fun to be the former, and its smattering of factual errors undercuts its value as a learning tool. ■

Charles Bermant is a reporter and editor for syndicated columnist Jack Anderson.



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Sy Merrin

To PC customers at Sy Merrin's Computerworks, a pioneering computer retail store, third parties count as much as IBM—if not more

BY CONNIE WINKLER

WESTPORT—Conn.—“IBM’s ability to control its accounts without a strong dealer base is inversely proportional to the number of pages in *PC Magazine*.” That’s one of Sy Merrin’s laws of the microcomputer industry—a corollary of Law No. 4, precisely.¹ It’s a law that Merrin, the father figure of computer retailing, spouts at every appropriate occasion. (And, a statement sure to catch the interest of the editors of *PC Magazine*.)

“Today,” says Merrin—formally Seymour—“you can’t give away all-Blue boxes.” Customers at his popular and successful Computerworks store here rarely walk out the door with an all-IBM supplied PC—they most frequently try another printer and typically intermix boards, modems, and cables from other suppliers.

Customers are savvy because they’re exposed to the advertisements in *PC* and other magazines. Adds Merrin, “customers are looking for value and price performance.”

Light Touch

It’s the combination of wit and insight reflected in Merrin’s theorems—and conversation, generally—that make listeners take notice, as they did recently at the annual Rosen Conference on Personal Computers, where Merrin participated in several panels. (His full set of laws is available to anyone who will bear with him.)

“I’m considered the old man of the industry,” says Merrin lightly. “It’s not that I’ve been in the business longer than anyone else; it’s that I’m older than anyone else.”

Indeed, the president of the Association of Better Computer Dealers (ABCD) has a Ph.D. in geology and in the mid-1970s was running a venture company,

Emdex Corporation (a subsidiary of Exxon Enterprises) developing light-sensitive semiconductors.

Merrin Meets Micros

While the chief executive at Emdex, Merrin purchased an Apple to learn about computers. “As a CEO I was so enthralled



about what it was capable of. I began looking into the industry and came to the conclusion that it was a business with a good risk and rate of return over time,” recalls Merrin. He was let go from Emdex and in December, 1978, incorporated Computerworks. “I saw that the industry would have to grow and that software would have to be created because the industry then existed in an economic vacuum.”

In the first days he sold Apples, S-100s (now defunct), and for a short time even, Commodores. When the IBM PC came along, Merrin, of course, snatched it up for his sophisticated business clientele—including many from large corporations, known in the industry as national accounts. (Fairfield County, Connecticut, is home to more than 40 Fortune 1000 companies; Paul Newman lives nearby.)

“It’s necessary for us to be

nationwide,” Merrin now says. “What is necessary will be.” He won’t specify when or how Computerworks will expand from its single location, but he’s just hired three key managers to lead training and field sales efforts.

Five Times as Much

As it is, Computerworks—with its current sales team—could sell five times as many personal computers as it can now get delivery on. Merrin sees this supply problem continuing—if not worsening. “As IBM reduces the amount of product available to dealers, we will be selling more of other people’s product.”

“We Like IBM”

“We want to sell IBM; we like IBM,” Merrin says, echoing the sentiments of other dealers. “But, we have to make money to survive. If it doesn’t recognize our need to survive and grow, then IBM is causing its own problems.”

“We believe there should be a partnership with IBM, not a confrontation.”

Merrin, who ironically worked for IBM Corporation in another capacity, as a materials scientist, acknowledges the internal dynamics within IBM: One division wants to support and nurture its dealer network; another contending mainframe-oriented division wants to hold onto the PC business in its lucrative national accounts.

Merrin doubts that IBM will squeeze its PC dealers out entirely by opening more and more retail IBM Product Centers. “The legalities are overwhelming,” he says.

However, that doesn’t mean easy sledding between IBM and dealers over the coming products. The 3270-PC with its multi-windows, color and PC-

to-mainframe link is a good example. “Whether or not IBM permits dealers to handle the 3270-PC, enterprising entrepreneurs will come along with comparable versions,” reports Merrin, who knows of two in the works.

Availability

Likewise with the IBM Portable, which is to be available this month, unfortunately in what’s expected—again—to be limited quantities. “We’ll continue to sell Compaqs,” said Merrin. “We are going to sell what we can sell; we’re not going to wait for IBM to dole out nibbles.” And, in fact, with Computerworks customers the Compaq has proven itself as a popular corporate machine.

Does he encourage others to jump into computer retailing? Not unless they have \$1 to \$1.5 million, or a niche business, or are in (or near) a metropolitan area with no competition. “The window is closed to the normal entrepreneur,” he sighs. “They don’t have the years I’ve had for this; I’m already here and established.”

Blood Bath Coming?

And, is the blood bath for retailers really coming, as Merrin suggested at one of the Rosen panels? “Earnings are down; profits are down; even revenues are down,” says Merrin, pointing to his fellow dealers’ businesses. “Those who don’t know how to sell have all been selling on price. If the price wars increase, it’s got to get worse.” ■

¹Merrin’s Fourth Law in its entirety is: “A major corporation’s ability to control its accounts without a strong dealer base is inversely proportional to the number of third-party entrepreneurs supporting that corporation.” ■

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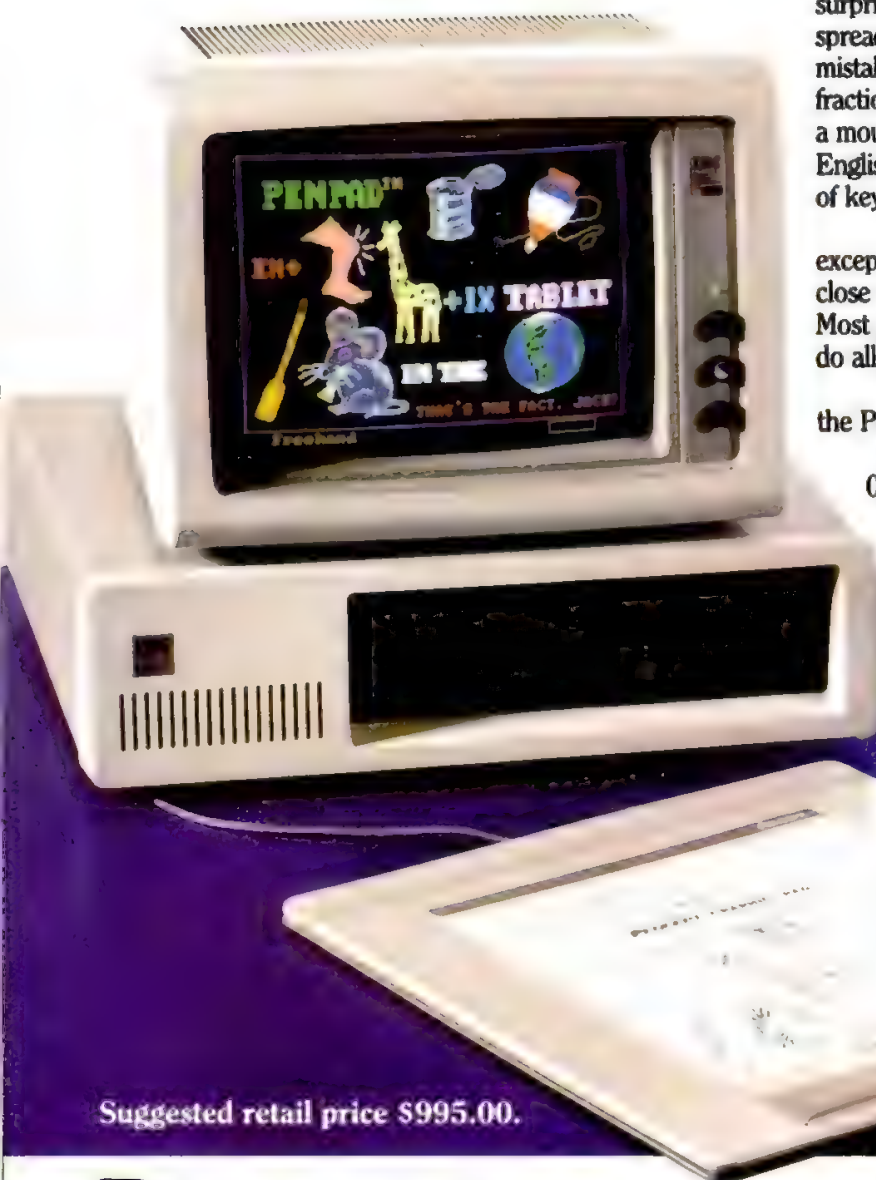
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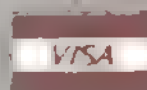
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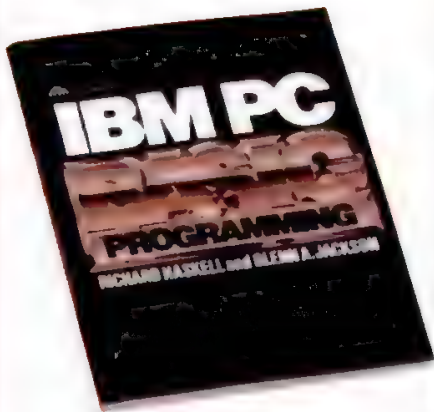
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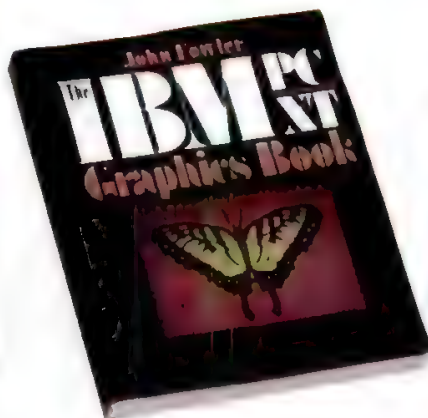
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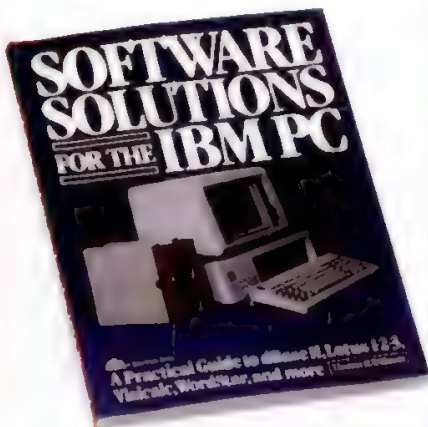
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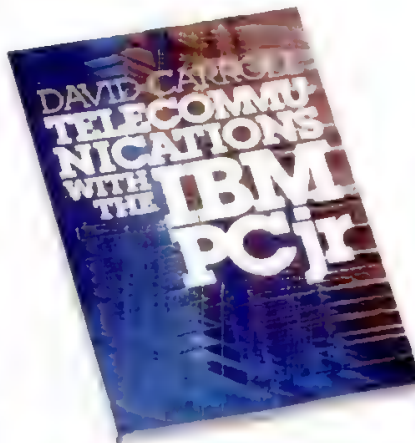
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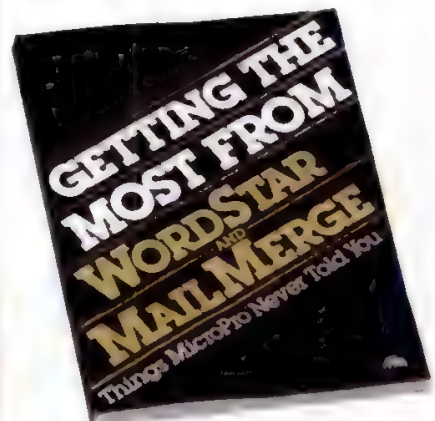
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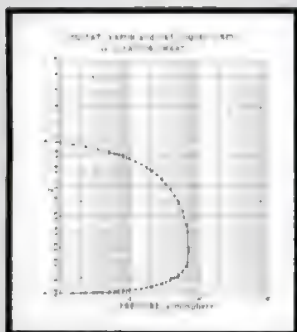


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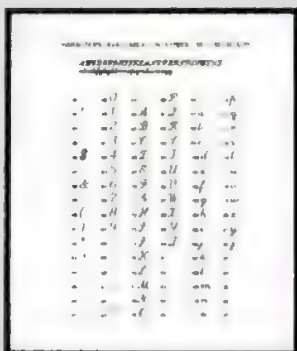


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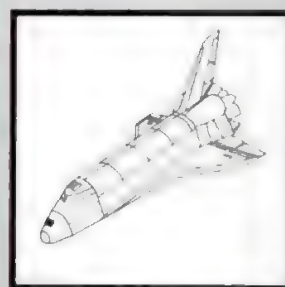
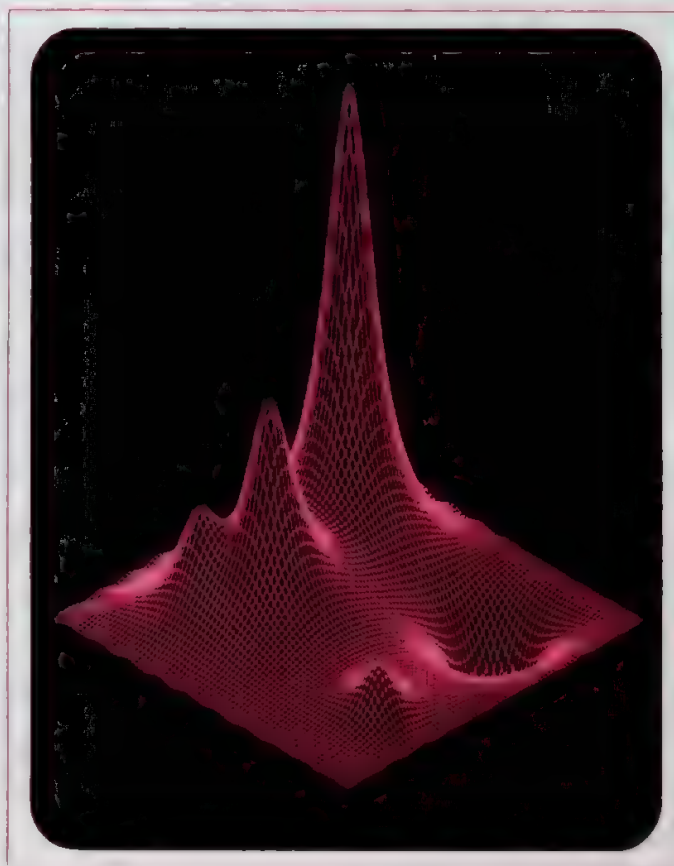
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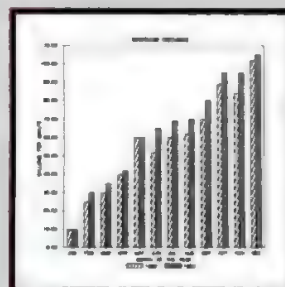
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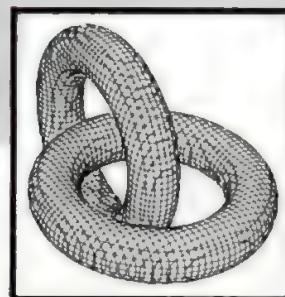
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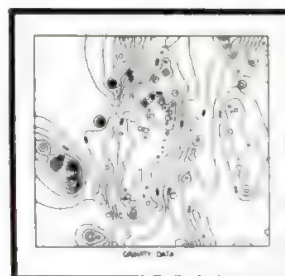
Digitizing



Business Graphics



Program Output



Contouring

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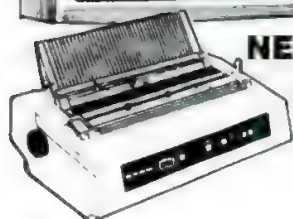
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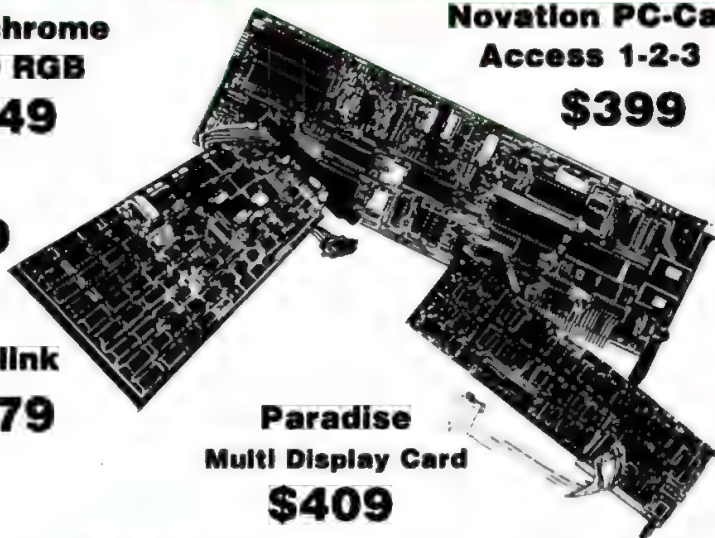
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Software Publishing - PFS Report, Write, File	\$ Call
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Softword Systems

Multimate (Newest Version)	\$ 295
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Plain talk about printers

Dot Matrix

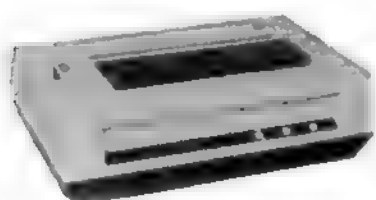
Printer compatibility with the IBM-PC marches on: the line-up includes the Microline 92/93, C. Itoh's Prowriter BPI, the Radix Series and NEC's 2050/3550.

ANADIX

9500B	\$1119.88
9501B	\$1119.88
9620B	\$1209.88
9625B	\$1309.88
WP-6000	\$2359.88
WP-6500	\$2599.88
WP-6000/6500 Tractor	\$139.88

C. ITOH

Prowriter 1 & 2 Prowriter BPI Prowriter SP



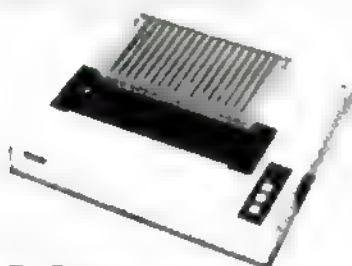
C. Itoh's Prowriter (120 cps) features 10, 12, & 16 cpi, a proportional/correspondence quality font, double strike, double-width, sub/super scripts, dot graphics (160 x 144 dpi) & friction/tractor feed.

The Prowriter BPI offers code-compatibility with IBM-PC block/dot graphics codes, & it has all the features of the Prowriter. A nice move.

The Prowriter SP (HotDot) has faster print speed (180 cps), true sub/superscripts and italics. A new printer with nice features.

Prowriter	\$379.88
Prowriter 2	\$609.88
Prowriter BPI	\$479.88
Prowriter SP	\$519.88

EPSON



RX/FX Series. SCALL

IDS/DATAPRODUCTS

P-480	\$439.88
Prism 132	\$1489.88
w/4-color	\$1699.88

INFORUNNER

Riteman	\$339.88
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MEMOTECH

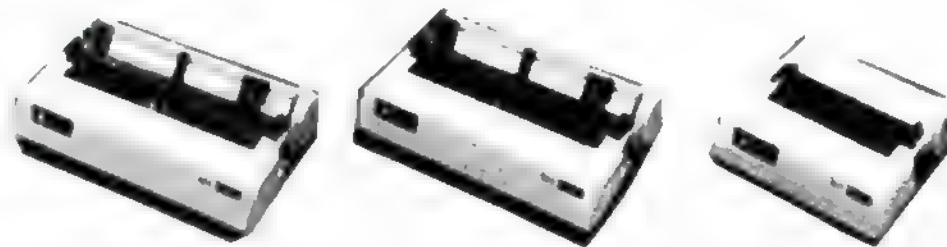
DMX-80

A dramatic black printer! The DMX-80 (80 cps) features 10, 12 & 16 cpi, italics, double-width, half-width, enhanced/bold print, dot graphics (120 x 144 dpi), friction/tractor feed. Comes with a 4,000,000 character ribbon. Epson code compatible in text mode (questionable in graphics). Quiet printing & a sharp design make it ideal for home or office. The DMX-80 is serviced by Panasonic.

DMX-80	\$339.88
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OKIDATA

Microline Family



The Okidata Microline family offers IBM-PC users a wide range of features for almost any application. All Microline printers are made with the same rugged materials and care. No matter which printer you select, you've chosen one of the best printers made.

The Microline 92 (160 cps) is ideal for word processing. It features 10, 12 & 17 cpi, a correspondence font, double-width, emphasis/boldface, sub/super scripts, underlining, pin/friction feed (tractor is optional on the 92) & dot-addressable graphics (120 x 144 dpi). The 93 is the 136 column version. Parallel interfaces are standard; the RS-232C interface is optional.

The Microline 84 (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/double-width), all with a correspondence mode & dot addressable graphics. Parallel or RS-232C interfaces available.

A new PROM called PC Plug-n-Play turns a 92, 93 or an 84 into an IBM-PC compatible printer, with full capabilities. You will sacrifice a few features (like 12 cpi) but the PROMs are worth it if total compatibility is your goal.

The Microline 82A (120 cps) is a data cruncher. Features 10 & 16 cpi (5/8 double-width). Dot-addressable graphics are optional. The 83A is the 136 column version.

Microline Series. SCALL

MANNESMANN TALLY

MT-160 L	\$629.88
MT-180 L	\$879.88
MT-Sprint	\$329.88

QUADRAM

QuadJet	SCALL
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STAR MICRONICS

Gemini 10X	\$299.88
Gemini 15X	\$429.88
Delta 10	\$499.88
Delta 15	\$589.88
Radix 10	\$629.88
Radix 15	\$739.88

TOSHIBA

P-1350	\$1739.88
P-1350 Tractor	\$169.88

Letter Quality

C. ITOH

A10 Starwriter F10 Starwriter F10 Printmaster



The C. Itoh Starwriter (40 cps) features 10 & 12 cpi, sub/super scripts, underlining, 6 & 8 lpi, Qume code & Diablo supplies. The A-10 Starwriter has the same specs, but it's slower (20

cps). The Printmaster has the same specs, but it prints faster (55 cps).

Both the Tractor Feed & the Sheet Feeder fit all three models.

A-10 Starwriter	\$599.88
F-10 Starwriter	\$1119.88
F-10 Printmaster	\$1469.88
Tractor Feed	\$219.88
Single Bin Sheet Feeder (A10/F10)	\$599.88

COMREX

CR-2	\$509.88
CR-2 Tractor	\$89.88
CR-2 Sheet Feed	\$189.88
CR-2 Keyboard	\$149.88

DIABLO

620 (RS-232C)	\$939.88
630 (PC)	\$2019.88
630 ECS (PC)	\$2359.88

DTC

DTC 380Z	\$1199.88
Tractor Feed	\$149.88
Sheet Feed	\$599.88
StyleWriter	\$759.88
Tractor Feed	\$129.88
Sheet Feed	\$279.88

NEC

2010/2030	\$899.88
2050	\$1039.88
3530	\$1699.88
3550	\$1859.88
2000/3500 Tractor	\$239.88
2000/3500 Sheet Feed	\$479.88
7710/7730	\$2199.88
7700 Tractor	\$379.88
7700 Sheet Feed	\$599.88

QUME

Sprint 11/40	\$1559.88
Sprint 11/55	\$1769.88
Tractor Feed	\$219.88
Sheet Feed	\$599.88
LetterPro (20cps)	\$709.88

SILVER REED

EXP-550/500



The Silver Reed EXP-550 (17 cps) is a 132 column letter-quality printer with 10, 12 or 15 pitch, sub/superscript, underlining & true Diablo 1610 emulation, making it compatible with most word processing software. It's friction fed, & it features a page injector, an optional tractor is also available.

The EXP-500 (12 cps) is a 100 column letter-quality printer with the same specs as the EXP-550, but slower & without page inject or proportional spacing.

EXP-550 (Parallel)	\$609.88
EXP-550 Tractor	\$129.88
EXP-500 (Parallel)	\$449.88
EXP-500 Tractor	\$119.88

SMITH-CORONA

Messenger

The Memory Correct III Messenger combines an electric typewriter and a letter-quality printer. It features 12 cps, 3 pitches (10, 12 & 15), variable line spacing, 10.5" writing line, backspacing & auto-correction. It comes complete with parallel/serial interface.

Messenger	\$589.88
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STAR MICRONICS

PowerType

The PowerType (17 cps) has 110 columns (11" print line), 10, 12 & 15 cpi, proportional type, sub/superscripting, backspace/underlining & Diablo 620/630 code compatibility. A nice printer for the price.

PowerType	\$359.88
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Accessories

Printer Stands

Heavy-gauge steel with a baked enamel finish (beige), with a paper slot in the center for bottom feeding. Fits 80 or 132 column printers (specify).

80 Column Stand	\$39.88
132 Column Stand	\$49.88

Microfazer

Parallel in/Parallel out printer buffers in 8K to 512K, configurations. These are stand-alone units with pause and copy/clear buttons. User expandable. Power supply included, but the cables are optional.

8K P/P	\$129.88
64K P/P	\$169.88
128K P/P	\$239.88
256K P/P	\$549.88
512K P/P	\$769.88
Male-male cable	\$29.88

Cables

Printer cables for the IBM-PC, IBM-PC/IDS, Compaq, Columbia MPC & VP, Eagle-PC/Sprint and many others, as well as 9-wire modem cables. All cables.

Printer Switches

2-way & 4-way switches for 36-pin Centronics or 25-pin RS-232C. All connectors are female, & cables are extra.	
2-Way Switch Box	\$109.88
4-Way Switch Box	SCALL

Monitors

AMDEK



300G (12" green)	\$149.88
300A (12" amber)	\$159.88
310A (12" amber)	\$199.88

NEC



JB-1205M (12" amber)	\$169.88
JB-1201M (12" green)	\$169.88

PRINCETON GRAPHICS



PGS HX-12	\$509.88
PGS Max-12	\$199.88

QUADRAM

QuadChrome	\$519.88
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ROLAND

DG-121 Composite (12" green or amber)	\$159.88
DG-122 TTL (IBM-Monochrome) (12" green or amber)	\$179.88

Modems

HAYES

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NOVATION

SmartCat Modems	
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1200 baud	\$439.88

Access 1-2-3	
IBM-PC internal board modem w/Crosstalk	\$449.88

US ROBOTICS

PC Modem	
PC Modem 64/PC Modem 256	
PC Modems are plug-in modem boards that have all the features of the Password	

The PC Modem 64/256 are also modem boards that also come with 64 or 256K RAM, a parallel port & real-time clock with a battery back-up	
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300 baud	\$159.88
PC Modem	SCALL
PC Modem 64K	\$579.88
PC Modem 256K	\$779.88
Telpac	\$69.88

US ROBOTICS

Password

Big features in a tiny package. The USR Password operates at 0-300 or 1200 baud, in either originate or answer modes, with auto-dial, auto-answer, full or half duplex operations, command echo, audio monitor with three modes of operation, verbose or numeric result codes and both DTR override and reversible Send/Transmit data (pins 2 and 3). Comes complete with RS-232 cable, modular cable and power supply. Works with CrossTalk, PC-Talk, SmartCom II, Perfect Link, etc., or with USR's own Telpac communications software. Specify type of computer when you order.

USR Password \$369.88
Telpac (IBM-PC) \$69.88



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ALLOY

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Complete hard disk/tape sub-system	SCALL
PC Backup	
Stand-alone 4-1/4" Tap Backup System	SCALL

AST RESEARCH

MegaPlus II	
Comes with an RS-232C port, clock & memory to 256K. Software included	
64K MegaPlus	\$319.88
256K MegaPlus	\$519.88
256K MegaPak	\$339.88
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Optional #2 RS-232C Port	\$39.88
Game Port	\$39.88

SixPak Plus	
The SixPak has an RS-232C port, a parallel port, clock & memory to 384K. Software included. An optional game port is also available	
64K SixPak	\$319.88
256K SixPak	\$519.88
384K SixPak	\$639.88
Game Port	\$39.88

HERCULES

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MA SYSTEMS

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I/O Processor	\$349.88

MICROSOFT

Mouse (mechanical)	\$149.88
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MOUSE SYSTEMS

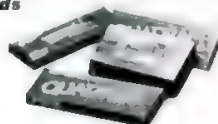
PC Mouse	
An optical mouse with "pop-up" menus for Lotus 1-2-3, Multiplan, VisiCalc, Volkswriter, WordStar, etc. Superior performance. Comes with optical pad, mouse unit, power supply & software	\$479.88

PARADISE/USI

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MultiDisplay	\$479.88

QUADRAM

Quadboards



The Quadboard has an RS-232C port, a parallel port, a clock & memory to 384K (you can also get your Quad board "naked," with no memory installed). QuadSpool/Drive software is included with every Quadboard, along with a one-year warranty

Quadboard SCALL

Quad 512+

Quad 512+ have a single RS-232C port on them, & socket for up to 512K RAM. QuadSpool/Drive software is included	
Quad 512+ (64K)	\$239.88
Quad 512+ (256K)	SCALL
Quad 512+ (512K)	SCALL

Quad Memory

The Quad Memory boards have no I/O ports on them, but they are socketed to 192K	
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Quad Memory (128K)	\$279.88
Quad Memory (192K)	\$339.88

Quadram Video Boards

The QuadColor-1 has 320 x 200 RGB, but with QuadColor 2 you get 640 x 480, 132 colors, much more besides. Exceptional!	
QuadColor-1	\$219.88
QuadColor-2	\$229.88

QuadDisk

An internal fixed hard disk, with interface board, software & cable	
12MB	SCALL
20MB	SCALL

Quad I/O

Quad I/O have a parallel port, an RS-232C port, game port & clock. Software included. An optional second RS-232C port is also available	
Quad I/O	SCALL

Single Function Cards

Parallel Card	\$79.88
RS-232C Card	\$79.88
Clock/Calendar Card	\$79.88

QuadLink

QuadLink is like having an Apple computer on one board, with 64K. QuadLink takes up only one slot. Add \$20 for Columbia MPC or Compaq computers when you order	
QuadLink	\$499.88

QCS

External Hard Disk

The QCS Hard Disk comes with an interface board & cables. Our personal favorite, used in-house for our mail list	
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20MB	\$2439.88
26MB	\$2629.88

TANDON

TM 100-2 Double-sided	\$229.88
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TITAN

Cygnus

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I/O (Par)	\$149.88
Cygnus I/O (RS-232)	\$169.88

Titan Board

A unique board socketed for up to 576K RAM. Includes a parallel port, RS-232C port, clock, software (Pseudo Drive/Spooler, Clock & Hard Disk), plus a SASI adapter for a hard disk interface w/64K	
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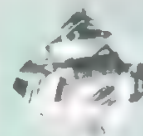
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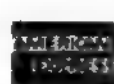
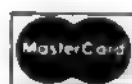


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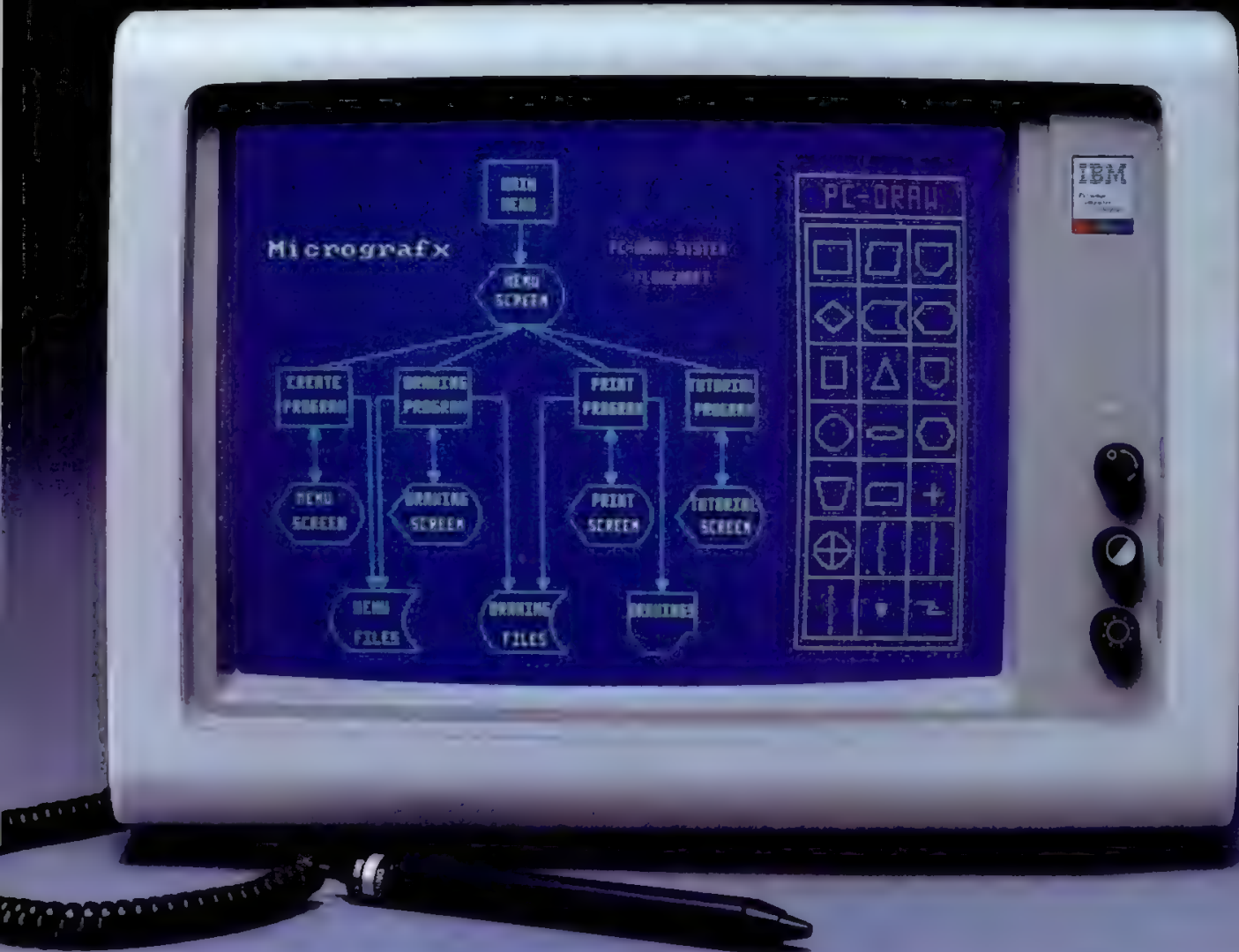
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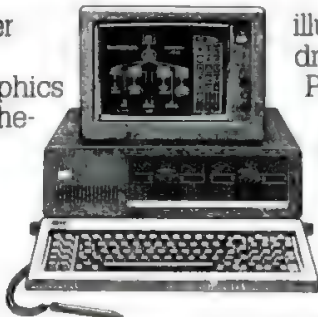
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Assault on Mount PC

PC's staff has been so busy climbing mountains that we nearly missed an auspicious occasion—PC Magazine's second birthday. We've been celebrating by ringing in some changes.

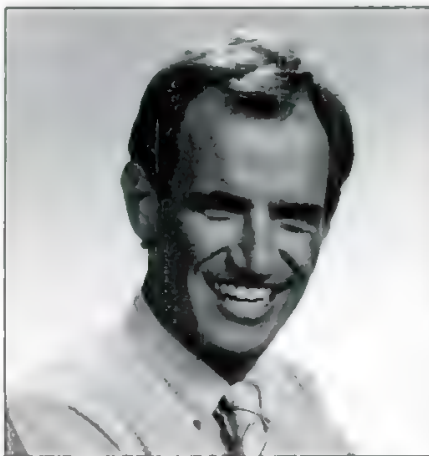
Call me Sisyphus. Remember him? He's the legendary Greek con artist who was condemned to spend eternity pushing a boulder uphill. This was his punishment for evading Death at an early age and living longer than he was supposed to. To work on the editorial staff at *PC Magazine* is to forever be rolling boulders uphill. But we're luckier than Sisyphus. Every 2 weeks we actually reach a summit by closing an issue of *PC*.

"Closing an issue" means different things to different people around here. To the copy editors, it means finishing the edit on the final surge of articles and sending them to the typesetter. To the art department, it means completing the design of every last page and sending the layouts to the insatiable production department. For the staff as a whole, an issue isn't really finished until we tear into the first "corner cuts"—rough, not-for-sale copies that arrive about a week in advance of the official copies.

For me, closing occurs when we send the layout boards for the last section we put together, "PC News," to the production department. That's the true point of no return.

On Top of the World

Usually this achievement, this arrival at the mountaintop, goes unnoticed by most of the staff. They are busy at work on the



Barry Owen

next "book" and the one after that and the one after that. Even for me, the High Priest of Deadlines around here, there's hardly time to catch my breath and take in the view. Sisyphus had his one woefully familiar eternal slope. I've got a whole intermontane complex of peaks spread out before me.

The summits are not of equal height. Some are friendly hillocks; others are more like the vertical face of Half Dome in Yosemite National Park. In any case, there's no time to linger. Another issue deadline always looms.

The result is that we ignore the view and hit the downward slope running. Putting this magazine out—researching, acquiring manuscripts, rewriting, copy

editing, illustrating, typesetting, laying out, proofing, and printing roughly 1,600 manuscript pages a month (about the size of a Manhattan phone book) takes all the momentum we can get.

Take a closer look at that coterie of publishing souls rushing over the summit. Notice anything about them? There are writers, copy editors, executive editors, technical assistants, page designers, mechanical artists, production wizards. But look closely; you won't see an advertising maven among them. In fact, our very successful and much-esteemed colleagues in *PC*'s ad sales department are conspicuous by their absence from the summit that represents a successfully closed issue of *PC*. There's a good reason for this.

Even if, as editors, we weren't committed to absolute editorial independence, the laws of the marketplace would demand it. We may think ourselves noble advocates of the reader—the underlying truth is, we have no choice.

PC is a special interest magazine. It represents your special interest, which, in this case, is the IBM Personal Computers. You want to know what works, what doesn't, and why. If, for example, you're an accountant, you not only need to know if the flashy, high-budget accounting software you've seen advertised works well, you must know if it incorporates the Generally Accepted Accounting Principles

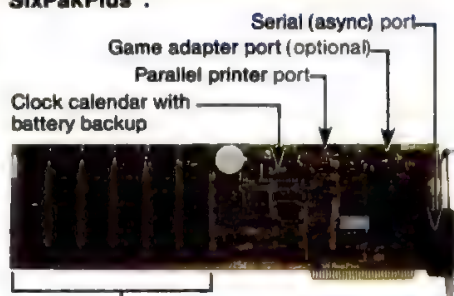
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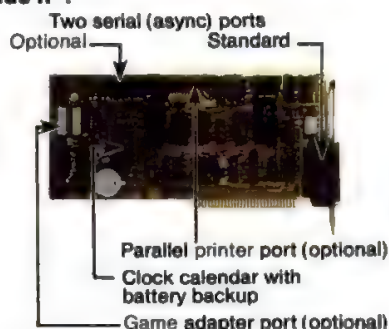
1 AST

SixPakPlus™:

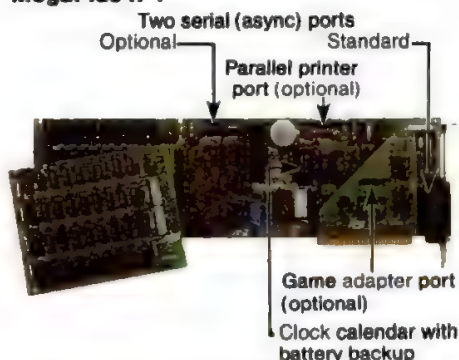


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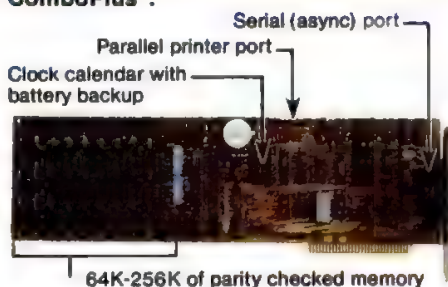


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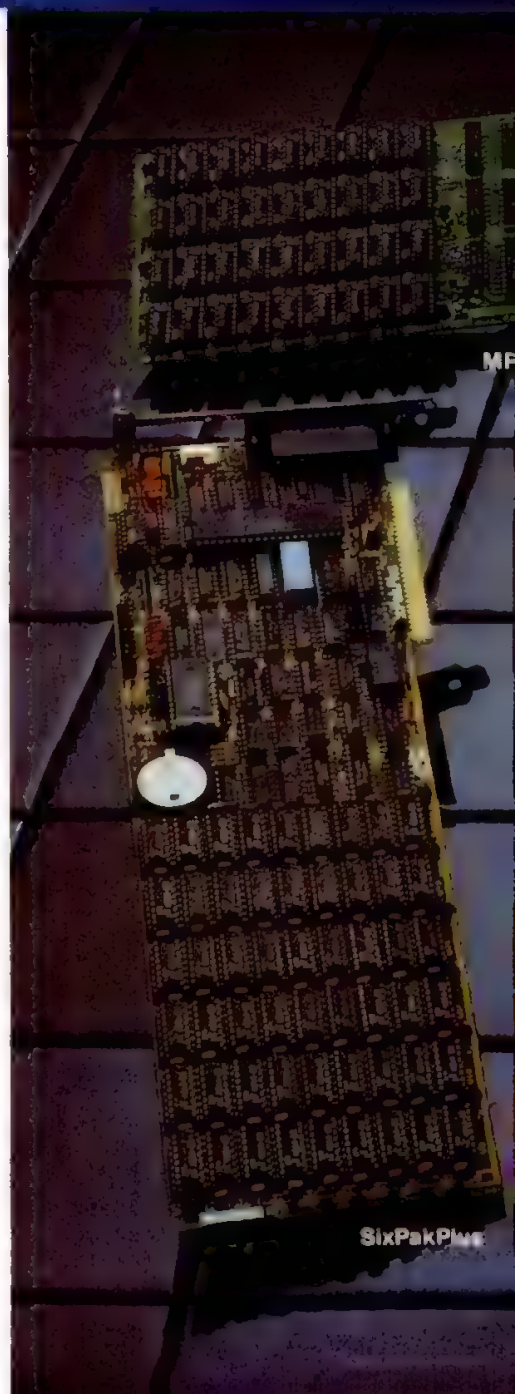


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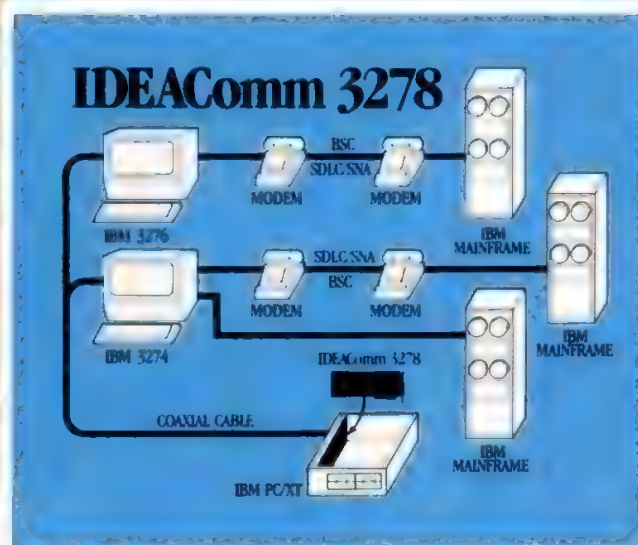
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EDITOR'S SCREEN

(GAAP) that are the guidelines of your profession. The advertised program may feature the most elegant solution to generating a spreadsheet from raw data a reviewer has ever encountered, but it's not worth a shredded ledger sheet if it doesn't allow for, say, batch totals or audit trails. The last thing you need is a review in *PC* that compromises objectivity because the sale of four expensive, brilliantly colored advertising pages depended on it. It's also the last thing we need. We couldn't survive without you. And the only way we know to keep you is to leave our advertising sales colleagues, who push boulders as fervently as we do, to their own mighty mountains.

The fact is, even as managing editor, I have not met most of our ad sales people. They work on a different floor, they're always crazy busy, and they know all about integrity, objectivity, and independence. That's why they're so damn good at what they do.

Happy Birthday, PC!

Recently a significant but unheralded anniversary came and passed. *PC Magazine* turned 2 years old. The day went uncelebrated because it was hardly noticed. The sad but telling truth is that nobody remembered the occasion until it was almost too late. Fortunately for us, no one can be certain exactly when *PC* was born.

The first issue, now a collector's item, didn't carry a cover date. An inconspicuous line at the bottom of the Table of Contents reads: "Premiere Issue—Volume 1 Number 1—February/March 1982." It was a slim 96 pages and cost \$3. This says something about something, considering that the last monthly issue of *PC* (Volume 2 Number 7) ran 804 pages and cost \$2.95, a cover price that's still in effect in the United States. Someone should sneak these figures into the mix of economic data crunched every month by the Department of Commerce. Inflation would drop to zero.

Anyway, realizing that our second



Our first issue was just 96 pages long.

birthday was upon us, I called over to office manager Iris Knittel (the K, mercifully, is silent). "I think we should celebrate," I said. Iris hastened to remind me of my recent "NO MORE OFFICE PARTIES" memo. I recalled Whitman's ever useful remark about "foolish consistency" and proceeded to talk cake. At this writing, we're planning a surprise, but I can't tell you anymore about it now. As it is, the copy editors are going to know too much.

While birthday party preparations must remain covert, *PC*'s latest format changes are available for your inspection. Long-time readers can attest to the fact that we're always changing. From 96 pages in the bimonthly Volume 1 Number 1, we grew to 224 pages in Volume 1 Number 4, our first monthly. By June 1983, the first issue in Volume 2, we weighed in at a whopping 636 pages. This reflected the growing success of the IBM PC itself and the subsequent boom in the number of products in the PC marketplace.

At the time, a number of readers complained that they couldn't find the articles amid all the ads. This was certainly a problem, but it was due to the overall size of the magazine rather than to a paucity of editorial pages. Advertisements never

steal space available for editorial. In fact, more ads mean more edit.

The IBM PC phenomenon continued to expand through 1983 and *PC Magazine* kept growing. It became clear late last summer that we were approaching heights that would have intimidated even one so dogged as Sisyphus himself. Something had to be done.

PC26 is Born

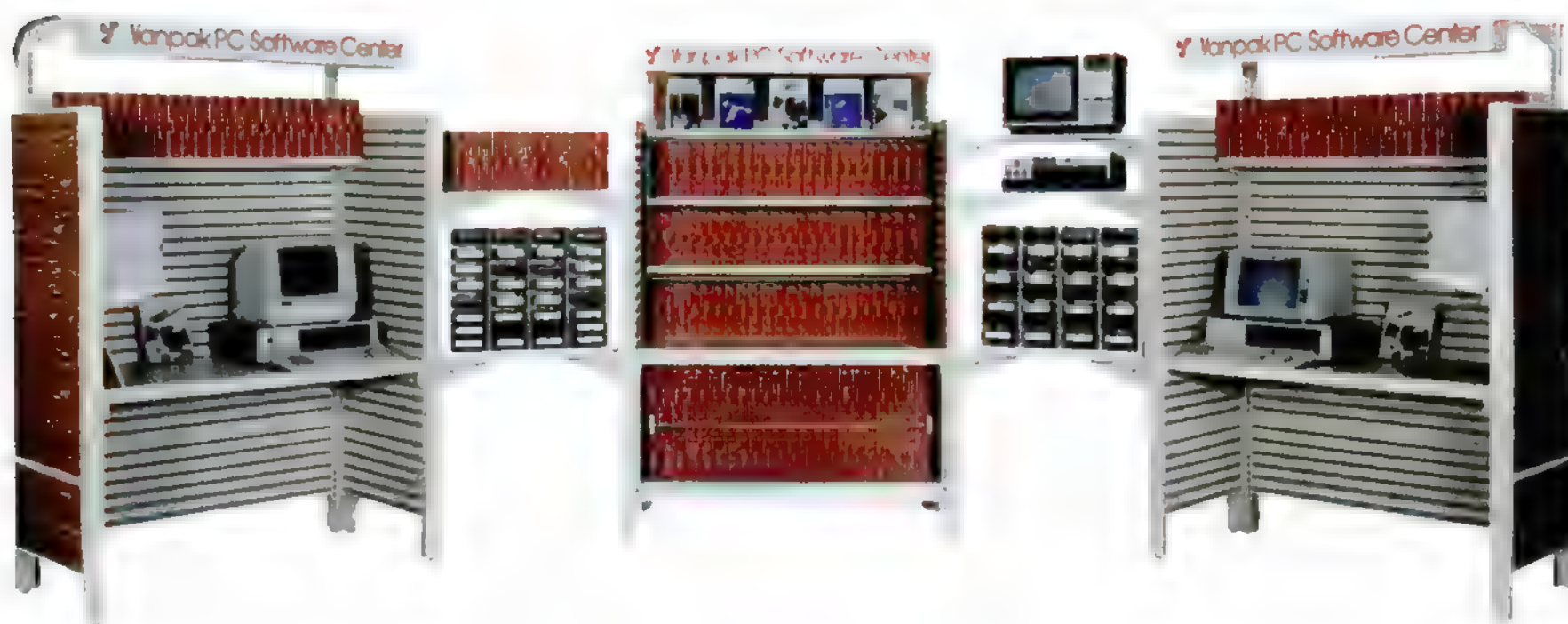
Enter *PC26*, the completely redesigned fortnightly *PC Magazine* that debuted in January. With the issue in your hands, we've delivered *PC26* eight times. Huzzah! Hooray! Three cheers!

When we launched *PC26*, we agreed to review it after six issues. The review is complete and the results are incorporated in this issue. Most of them are minor but worth noting. We're fine-tuning *PC*. Special projects editor Paul Somerson, familiar as the author of many software reviews and cover stories, persuaded us by the volume of mail he receives each week to expand "User-to-User." An unwavering advocate of the hacker, a term we use with respect to mean "technical explorer," Paul has further convinced us that the technical material needs more "presence." So you will find an expanded "Languages/Programming" column grouped with "User-to-User," "PC Tutor," and "Telecommunications"—a haven for hacker's.

What else? "Guest Editorial" is slightly shorter. "What's Inside" is slightly longer. The former, incidentally, is authored by invitation. Is there anyone whose opinion you'd like to hear, or a subject you'd like to read about? Let us know; we'll try to arrange it. Finally, you'll notice more illustration in the coming weeks. This is the domain of art directors Mitch Shostak and Mary Zisk, who have received the go-ahead to commission even more of the art that so enhances *PC*.

The mayor of our city is constantly asking, "How'm I doin'?" It's a pretty good question. How are we doin'? If you get a chance, let us know. ■

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The Death of Print?

Will electronic books, magazines, and newspapers kill off print technology? The chip may eventually replace the printed page as our preferred medium, but it won't happen any time soon.

Surprising, isn't it, how hard it is to kill off a nice little technology like print. Books, magazines, and newspapers should have disappeared long ago, obliterated by moving pictures, radio, telephone, television, microfilm/fiche, or some combination of all of them. Will computers succeed where these other technologies have failed?

Believing, no doubt, that his book would be the last of its kind, Christopher Evans predicted in *The Micro Millenium* (New York: Viking Press, 1979) that computers would succeed and that books would "begin a slow but steady slide into oblivion" during the 1980s. Evans gave the process a decade or so. But as we near the halfway point, books are still very much alive.

Evans thought of four reasons why computers would make books disappear. The first is storage capacity. Computers can now, or will eventually be able to, store more characters per unit than books. The second is cost. The cost of computer memory keeps dropping. Costs are approaching the point where it will be cheaper to store characters electronically than on the printed page.

The third, and perhaps the most important, is display capability. Potentially, electronic display is far more capable than print. Even in its current embryonic form, windowing software offers simultaneous



Barry Richman

viewing of more than a single page from the same text.

Fourth and finally, Evans argued that the book is a passive conveyer of information, whereas the computer can be an active participant in a dialogue. As an example, he suggests a dictionary that could interpret an incorrect spelling and return a cluster of information, including correct spelling, relevant cross-references, translations, and so on.

Evans' arguments may seem persuasive, but I don't entirely agree. Let's take them point by point. The computer's greater storage capacity is a feeble reason in and of itself. Consider microfiche to see why. Even if you can engrave the Bible on the head of a pin, it doesn't matter: the

medium has no ergonomic future.

A computer's smaller cost per character stored may not weigh heavily either. Total out-of-pocket cost, not cost per character, is what interests consumers. Before computerbooks can prevail, the price has to drop low enough so that every member of the family can have one to plug their individual "bookchips" into.

I do, however, agree with Evans' point about computer display capacity—it will be superior. But at present, in comparison to print, computer word display is bad if cheap and expensive if good. None of it approaches mass market print in quality, variety, clarity, or integration with illustrations.

So far as the computer as active participant is concerned, the problem here is that no computer can currently decide cultural context or meaning in the way humans do. Active participation, as Evans means it, demands a level of artificial intelligence technology as far from our reach right now as the portable fusion battery.

For the moment, the reports of the death of print seem much exaggerated. But we will, in the end, get the technology we want. What do we want? ■

Barry Richman is general manager of Osborne/McGraw-Hill, a Berkeley, California-based microcomputer book publisher.

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Letters To PC

Chameleon's Concern

I thoroughly enjoyed your last issue of *PC Magazine*, but I was discouraged by your article on the Seequa Chameleon ("A Switch-Hitting Portable," *PC*, Volume 3 Number 3). Stephen Smith did a superior job of reporting on the problems with the Chameleon, but he didn't give readers any solutions. I have owned my Chameleon for a little over 6 months now, and I am fairly satisfied with it. The bundled software is excellent. Of course, as with most other PC compatibles, the documentation is a little thin.

One of the largest problems that Smith brought up was the serial port. The Chameleon does come with one, as stated, but IBM diagnostics failed to locate it because it is at a different address. This meant none of the IBM BASIC programs that use communications files will work. Seequa promises that GWBASIC patches this problem.

Smith also noted that the Chameleon has no monochrome board, but will have one soon. The Chameleon does, in fact, have a monochrome board, along with a color graphics board, but sometimes this fact proves to be more of a hindrance than a help. To see what I mean, try running a program that checks for the monochrome board.

In the interim, until GWBASIC is released, for those wishing to have an advanced terminal package other than *Cterm*, *Crosstalk XXVII* was just released in a Chameleon-specific version. However, I have not been able to locate it.

Tim McClarren
Wheaton, Illinois



How Compatible is PCjr?

I wonder about the compatibility of the PCjr with IBM PC software. Your enthusiasm towards the machine is quite evident in your January 24 issue (*PC*, Volume 3 Number 1). I've been looking for a small computer for my 9-year-old son, with whom I've been sharing my PC for more than a year.

I took some program disks down to the local ComputerLand to try them out on the PCjr. I was not prepared for the fact that few of the programs would run on it.

Is there a trick to getting programs to run on the PCjr? Right now I'm hesitant to throw away the hundreds of dollars I've spent on IBM PC software. I had expected the PCjr to be the answer, but apparently it isn't.

Peter Morse
Honolulu, Hawaii

Actually, hundreds of programs do run on both the PC and the PCjr. While we aren't keen on incompatibility, we do realize that IBM shouldn't be blamed if a third-party

program doesn't run on one of its machines. And, now that the PCjr is widely available, we should see hundreds of new programs written especially for it. Stay tuned.—Ed.

Programs For Our Town

We were glad to read John P. Jennings's letter in "Letters To PC" (*PC*, Volume 3 Number 3), requesting information about computer programs devoted to municipalities. Count Systems was founded 2 years ago expressly to provide high quality data processing services to small-and-medium sized governments.

Working in conjunction with Arthur Young and Company, the CPA firm, we have completed 15 installations in cities and towns across the United States and Canada. Our client municipalities range in population from 4,000 to 25,000. Our current product line includes four systems, all running on the IBM PC-XT. *Count 1* is a fully-integrated governmental accounting system that is based on accounting procedures recommended by the National Committee on Governmental Accounting and the Municipal Finance Officers Association. *Count 2*, a versatile utility and service billing system, lets small governments automate in-house. The payroll and personnel system, *Count 3*, is the only one we know of that meets the complex accounting and deduction requirements of local governments. Our latest release, *Count 4*, is a municipal tax system. A voter registration system is under development and will be available soon.

With particular reference to the needs mentioned by Jennings, the *Count 1* fund

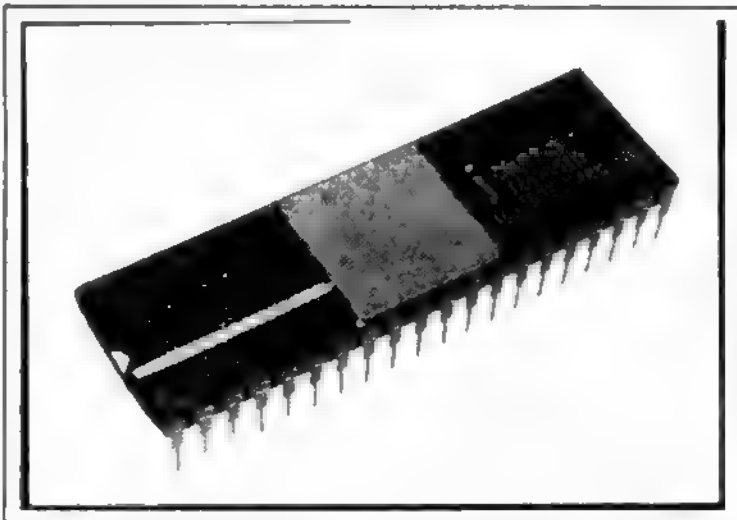
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accounting system is specifically designed to maintain such records as cost of police service, road maintenance, sanitation, and other services. The *Count 4* tax billing and collection system will take care of tax records, maintenance, and billing.

I hope Jennings will find these programs useful. Our address is 408 LeFardur, Slidell, LA 70458, (504) 641-5411.

Tom Uffelman
Slidell, Louisiana

I am responding to John P. Jennings's plea for municipal software. Northwest Systems, Ltd., specializes in software for municipalities with a package called *PC-FUND*. It includes general ledger, accounts payable, payroll/personnel, utility billing, and budget forecasting systems. The package is currently installed in six states. Our address is P.O. Box 773028, Steamboat Springs, CO 80477, (303) 879-5770.

I hope this information is of help to Mill Neck and other small municipalities.

Herbert A. Allaire
Steamboat Springs, Colorado

Power Failure

A question remains unanswered in my mind after reading Jay BloomBecker's article "Friend And Foe: Computers in 1984" (*PC*, Volume 3 Number 1). What happens when the government either shuts off the power or regulates it in some way?

Mark P. Salmon
New York, New York

Jay BloomBecker replies:

What indeed! Although outright shut-offs seem far from conceivable, delays and hindrances in the technologically feasible use of the communication channels are already evident. Consider, for example, the speed with which the Japanese are authorizing the use of modems, or the recent 500 percent increase in rates for use of telephone lines for the transfer of

data. Eternal vigilance is always the price of liberty, especially when seemingly dull and arguably technical conversations about telecommunications policies can so drastically influence our lives.

Word's Worth

I would like to disagree with the generally lukewarm review of Microsoft's *Word* ("The Unfinished Word," *PC*, Volume 3 Number 3). Having used *WordStar* and *PerfectWriter* over the past year, and *Word* for 2 months of heavy writing, I can flatly say that *Word* is the most powerful, advanced, and easiest word processing program I have ever used.

True, it's not perfect. Like every other program, it has its faults, and your reviewer found them all. However, what it does well, it does uniquely well, and its strengths are dazzling. The mouse, which I initially suspected was a gimmick, speeds up the editing of complex documents by at least 100 percent. Its automatic formatting capabilities are amazingly powerful and yet elegantly easy, footnotes are a cinch, and its windows allow me to keep several related documents on screen simultaneously.

Your reviewer is undoubtedly right when he says the program will get even better in its later versions, but I think that it is good enough to be in a class by itself right now. The review is valid, but it misses something.

Word's review is similar to a review of a Ferrari that criticizes the car for not having a back seat or a big trunk or not getting the gas mileage of a Toyota. Perhaps this mistaken emphasis was because the reviewer used the program for only a week; sort of like a 15-minute tour of the British Museum.

Ivri Kumin
New Orleans, Louisiana

Missing Only One

After reading Kevin J. O'Connor's and William Alfred's letters in "Letters To *PC*" (*PC*, Volume 3 Number 3), I felt moved to write to you. In so doing, I hope

to satisfy O'Connor's request for fewer product reviews in letters, and to underscore points 5 and 7 of Alfred's letter.

I began thinking back to 1982, and the first issues of *PC*. I still remember being at a computer show in Nassau Coliseum and coming upon *PC Magazine's* booth. I was wearing my "I Love my IBM PC" button, and the person behind the table commented on it. Well, the only thing that I bought that day was Volume 1 Number 1 of your magazine. Little did I know that at the time I had bought the first and only issue to be under 100 pages!

Since that time, I have amassed (and I do mean mass) all of the issues of *PC*, except one. In order to make my annals complete, I need to find Volume 2 Number 1. There is a space on my shelf just waiting for it, but alas, it is empty. I have scanned each issue since then for an order form of back copies, but I have found none. Therefore, I ask myself and my fellow readers—where the heck do I send my check for a back issue?

Peter St. Wecker
Richmond, Indiana

Requests for back issues of PC should be addressed to PC Back Issues, CN 1914, Morristown, NJ 07960. Please enclose \$5 per issue, which includes postage and handling.—Ed.

Is There Piracy In Taiwan?

As a long time reader of *PC*, I was quite disappointed with the article "PC Piracy: Growing By Leaps And Boundaries" (*PC*, Volume 3 Number 1). People at Multitech are quite annoyed by all the distortions and inaccuracies that have been made about our company and Taiwan in general in recent months.

We have tried our best to answer the questions and concerns of the computer community so as to clear our name and reputation. A recent Congressional fact-finding mission led by Stephen Sims of the Subcommittee on Oversight and Investigation came to Taiwan and received straightforward answers on the issues of

LETTERS TO PC

computer piracy and what was being done in Taiwan to prevent it. He himself even said that the testimony given by James Tunness (which was quoted in the article) was distorted and was losing a lot of weight in the eyes of Congresspeople concerned with the issue. I will plainly tell you that Tunnell probably never came to Taiwan or Asia to investigate the industries out here. Major portions of his testimony were copied word for word from articles in the *Asian Wall Street Journal*.

Martin Porter has the same limited concept of what is going on in Taiwan. He seems to overlook the fact that there are over 30 United States companies now in production of IBM PC compatibles, as well as several Japanese firms now moving into production. What makes these companies any different than Taiwanese companies producing PC compatibles? By the same token, I guess we could call Compaq, Corona, and Columbia pirates. Multitech has signed sublicenses with Microsoft for the MS-DOS operating system and is in negotiations for the GW-BASIC programming language. Our machines are as legitimate as any others on the market.

The whole issue of copyright protection is one that is yet to be defined. It remains clear that there is still no standard under existing law for how much protection software is given. We truly think that intellectual property, including software, should be protected under law. We feel that certain limitations to such protection are brought about by the need for compatibility, the restrictions of hardware, and the algorithms involved in programming.

Porter's report distorts many facts about Multitech. First of all, we have not been involved in any civil suit with Apple in Taiwan. Nor have we changed our coding by court consent. We have been in contact with Apple, and they have examined our software, but there have been no definite decisions made. We have also not stopped manufacturing the MicroProfessor line of products. Our dispute with

Apple only applies to one machine, the MPF-II. The other products in the MicroProfessor line are not involved. In fact our MPF-I learning kit is the world's largest selling microprocessor training kit with more than 50,000 sets sold around the world.

I also do not know what Porter means by a "high-level Chinese-language computer." If he could tell us what this is maybe we could try to invent one. What we do produce is a Dragon Chinese terminal that is capable of generating up to 22,000 Chinese characters. The Dragon can interface with many popular mainframe and mini-computers.

Sure, the counterfeiting problem exists, but only a small number of underground factories are involved. All respected members of the Taiwanese computer industry have taken steps to prevent these firms from ruining the image of the industry as a whole.

Michael J. Conley
Taiwan, Republic of China

Team Work On XT/370

Thank you for publishing the article about me in the "People in the News" section of *PC* (Volume 3 Number 1). The story accurately reflected the enthusiasm and dedication I felt when I was working on the IBM PC XT/370.

However, I don't want to leave anyone with the impression that such a development effort is ever a one-person show. Dozens of managers, engineers, programmers and support people worked tirelessly and with a great sense of team pride to bring the XT/370 to the marketplace. They can justifiably be proud that their efforts were so successful.

Lucie Fjeldstad
Endicott, New York

Color To Come

I enjoyed reading "Screening The PCjr's Color, Video, and Memory Options" (*PC*, Volume 3 Number 1). Is it technically feasible to make a color graphics adapter that will allow the PC to have all the

same graphic modes as the PCjr and will one be forthcoming? This information would be of interest especially for PCjr software developers working on PCs.

Dick Gall
Dallas, Texas

Where there are markets, there are manufacturers.—Ed.

PC Beats Penthouse

For the past year or so (in whatever room of the house my wife allows) I have been hammering away on my beloved IBM PC. I started with *Easywriter 1.1* and it wasn't that easy, as most folks know by now. Try underscoring with it, or worse, try editing something that was underscored. Yuk! When you're finished, if you can finish, take a look at the output. Broken dashes, in my humble opinion, are not underscores.

Since *PC* has almost surpassed *Penthouse* as my favorite magazine (either a sign of old age or a desire to join the kids of the computer-literate era), I usually spend a lot of time reading it. I don't recall seeing a review of *Wordplus*, and would recommend you look at it. I think you'll like what you find, although I thought *PIE: Writer* was one of the most difficult packages I've ever seen, and you folks thought it was pretty neat. To each his own.

One thing that most of us IBM PC users do seem to agree on is the quality of your magazine, particularly impressive because of the size of your issues. I use it at work on a daily basis, for user information and education, software and hardware evaluations, and as a reference for competitive pricing of various vendor products. I never go to a meeting without a copy, and I almost always quote something from one of your ads or articles, hopefully to help keep our development and pricing staffs as up-to-date as possible on what's going on in the marketplace. And since I travel frequently, I love your new twice-monthly format! My right arm was starting to look really weird as a result of lugging around

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R. A. Duman
Dunwoody, Georgia

User Groups

I am a PC subscriber and have read that you publish a periodic listing of PC user groups and their activities. How can I find out more information about PC user groups in my area?

Ross Briskin
Green Village, New Jersey

PC currently prints a partial listing of current user group addresses in "Club News" each issue. Refer to this for up-to-date information about club addresses and phone numbers. In the future, we will begin focusing on the activities and innovations of particular clubs. We will continue to periodically publish the addresses for user groups known to us.—Ed.

The Number Is . . .

My thanks to Jan Diamondstone and John Bodie for mentioning our company as a source of educational software for the IBM PC in their article, "Computer-Assisted Instruction: Flying High With Pilot" (PC, Volume 3 Number 2). We would appreciate your printing our telephone number, (619) 287-0795, which was omitted from the article and caused complaints from prospective clients who had to call San Diego information to obtain it.

Minna Fonti
The Answer in Computers
San Diego, California

Making Flippy Floppy

People who have single-sided drives should be aware that there is a way to use the backside of a disk: Buy reversible disks, the so-called "flippies." Since dealers can almost double their profits by selling you two boxes of single-sided disks instead of one box of reversibles, it isn't



LETTERS TO PC

too surprising that you don't see them advertised. In fact, the only reversible disks I've found are made by Memorex, part number 3480. I order mine from Pacific Exchanges for about \$30 a box. The phone number is (800) 235-4137.

Leo Scanlon
Inverness, Florida

Copy Protection

I've found that PC's product reviews don't tell me if a software product is copy-protected. Since I use a RAMdisk extensively, whether or not a program is copy-protected is an important consideration.

Edward Wolcott
Gainesville, Florida

Okay, we'll begin mentioning copy protection and considerations for RAMdisks and hard disks in a few issues.—Ed.

One Drive or Two?

After reading Winn Rosch's article "Removable Hard-Disk Drives: A Workable Alternative" (PC, Volume 3 Number 2), I immediately sent my \$17.95 check to Tecmar Inc. and I am eagerly awaiting the delivery of what must surely be a very economical hard disk.

The article failed to address one question that is likely to be of interest to many PC owners. The picture at the bottom of page 236 indicates that the Tecmar drive takes its power from one of the two internal power connectors. Does this mean that if you have a PC with two half-height floppies in slot A (using both power connectors) you must disconnect one of them in order to use the Tecmar drive?

Robert Pirko
New York, New York

Winn Rosch replies:

The Tecmar unit does, in fact, draw its power from one of the two disk drive connectors. With a little electronic ability, you could adapt the unit to your PC's configuration, but I'm reluctant to advise doing so. The PC does not support more than two drives in its main chassis (its

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LETTERS TO PC

multidrive systems use an expansion chassis). Though I have seen PCs successfully configured with four half-height drives in the system unit, I would worry about the heat added to the already questionable internal temperatures of the PC, particularly if you've also stocked up on expansion cards.

The price is indeed a bargain, and I sent in an order for two dozen units as soon as I saw them in the magazine. Alas, we writers are rarely in touch with the real world. Another editor called the manufacturers to confirm the hard disk pricing and quite accurately transcribed what was heard over the phone—to wit, "seventeen ninety five." I guess we're all using computers because we're not very good at math and occasionally misplace decimal points! (See Corrections.)

Corrections

The correct price for the Cartridge Winchester in PC, from Tecmar, Inc., is \$1,795, not \$17.95 as reported in the article "Removable Hard-Disk Drives: A Workable Alternative," (PC, Volume 3 Number 2).

In "Online With A Special Interest" (PC, Volume 3 Number 4), the program, CVTHEX.BAS was incorrectly credited to Terry Davis. The program was originally written by Jeff Garbers and has since been altered and improved by various SIG members. The current version is unsigned and on file under the CompuServe account number of one of SIG's system operators.

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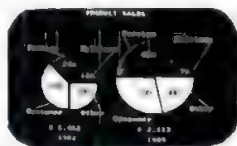
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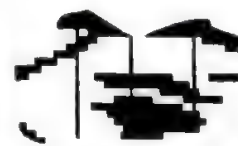
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The Messy Connection

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Tearing Data Files Asunder

The first factor is whether the data files are predefined and small in number—an accounting system is a typical example. With this sort of program the amount of data may grow, but the number of files doesn't. In effect, the data files are an integral part of the programs that work with them, and there's little reason to separate



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Reuniting Programs and Data

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problem of bringing them back together. There are two basic ways of doing this, and which one is best depends on the second of the two factors: whether or not the program uses helper files.

Some programs, using only the data we ask them to, work completely by themselves. Other programs—particularly newer, more sophisticated ones—make use of what I'll call helper files. These are files that the program needs in addition to our data files. For example, spelling checkers use dictionary files. Some programs use overlay files to read in parts of themselves. Other programs store their help screens in separate files, and still others keep track of the way we've set them up in initialization, or "profile," files.

To decide which is the best way to connect our programs and our data, we have to know if the program is self-sufficient or if it uses helper files.

You'll recall from our previous discussion of program paths and current directories that DOS will hunt for our programs, but it won't look for our data files. If our programs are scattered around various subdirectories, they can still be on tap thanks to the PATH command, which tells DOS where to search for programs. For data files, though, it's a different matter. When DOS is asked for a data file, it will look in only one place: the current directory of whatever drive is being used.

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There are lots of advantages to working in our data directory and having DOS bring the program to the data. For one thing, it lets us use the DIR command to take a quick look at the names of our data files. And if our program, like many word processing programs, has the ability to display file names, we can see all our data files while we're in the middle of using the program.

Here's Where It Gets Messy

With programs that use helper files, though, we have to turn things around and bring the data to the program instead of bringing the program to the data. Here's how it's done. In order to work with our program and all of its helper files, we first have to make sure that the program's directory is in our current directory. Our own data, though, is stored in a separate data directory where we can keep track of it. When we want to use the program with our data, we copy it to the program's

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The exact nature of this kind of batch file will depend on how you like to work and the peculiarities of your programs. A similar batch file can be used if you want to work the other way—copying the program to your data directory, using it, and deleting it. The principles are the same.

All of this isn't too pretty, but it's the kind of dirty work we need to do until programs and operating systems get more sophisticated about the use of subdirectories.

I've shown you my approach to the annoying problems of managing the number of files and the amount of space that comes with a hard disk, but I can't say that I'm overly pleased with my solutions; in general, they're not as tidy as these things ought to be. Luckily, my suggestions aren't the only way to cope with a hard disk. Other approaches are possible, and I'm counting on some irate readers to write in and tell me how I got it all wrong. If anyone can shoot me some better ideas, I'll pass them along.

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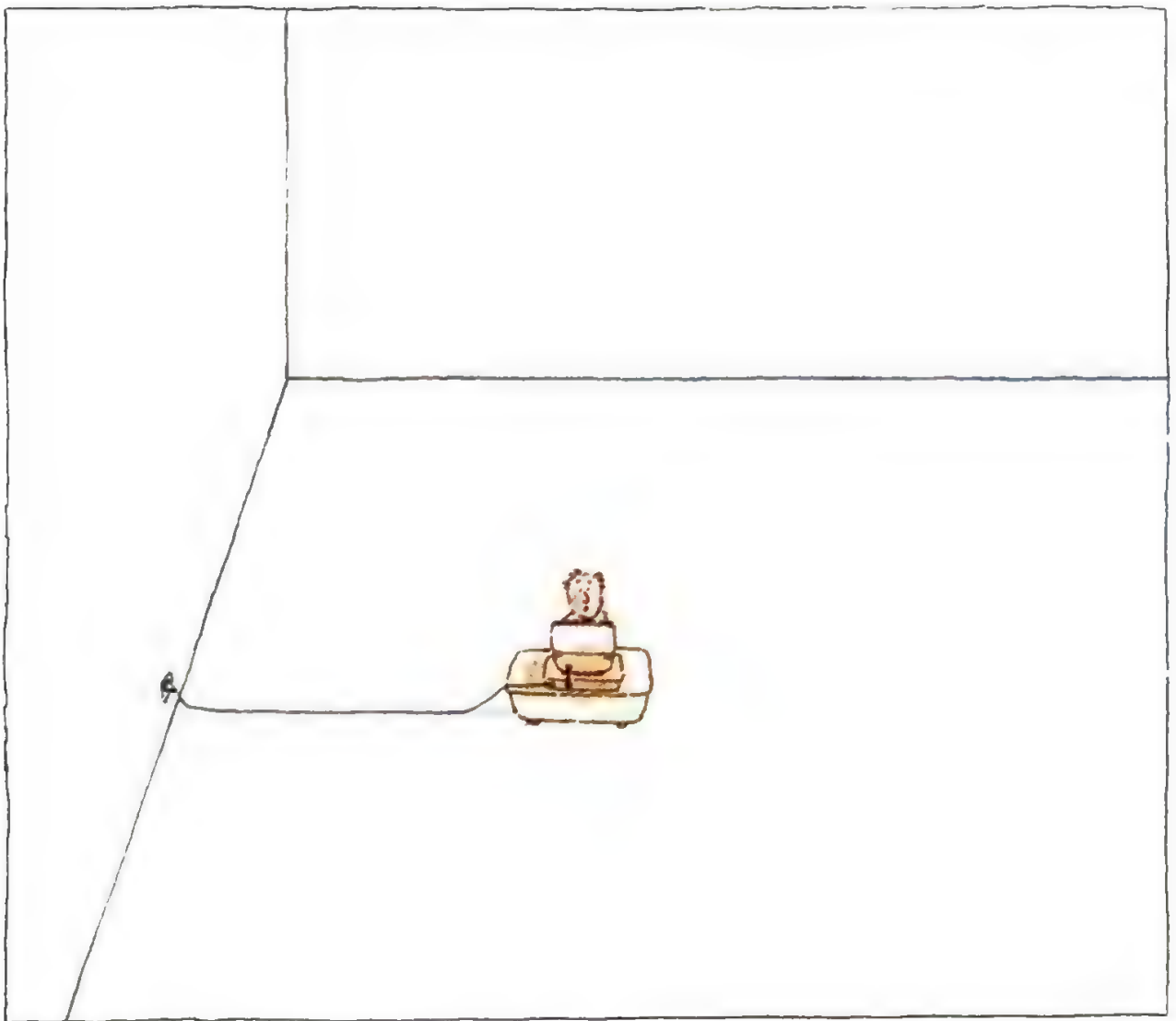
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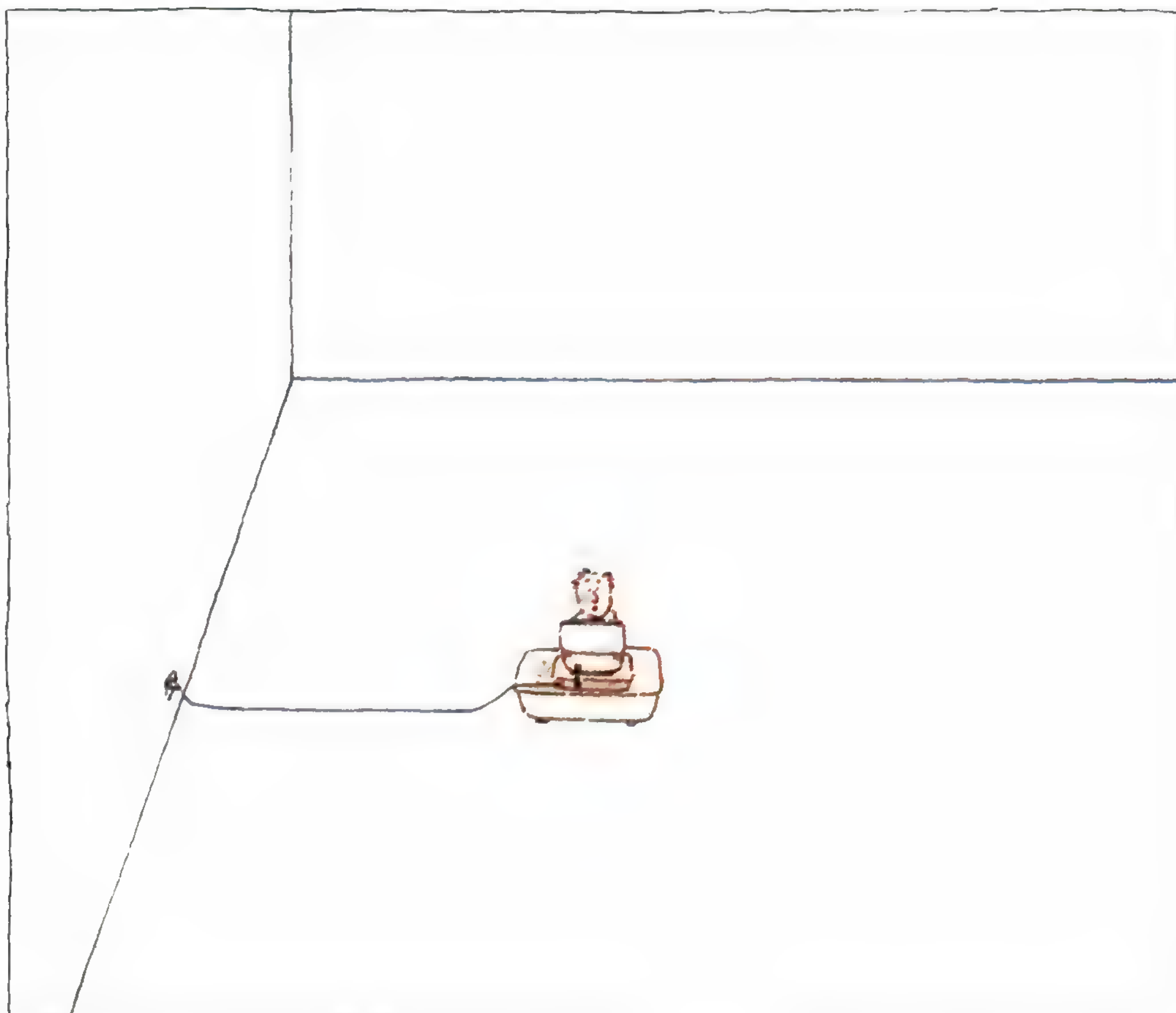
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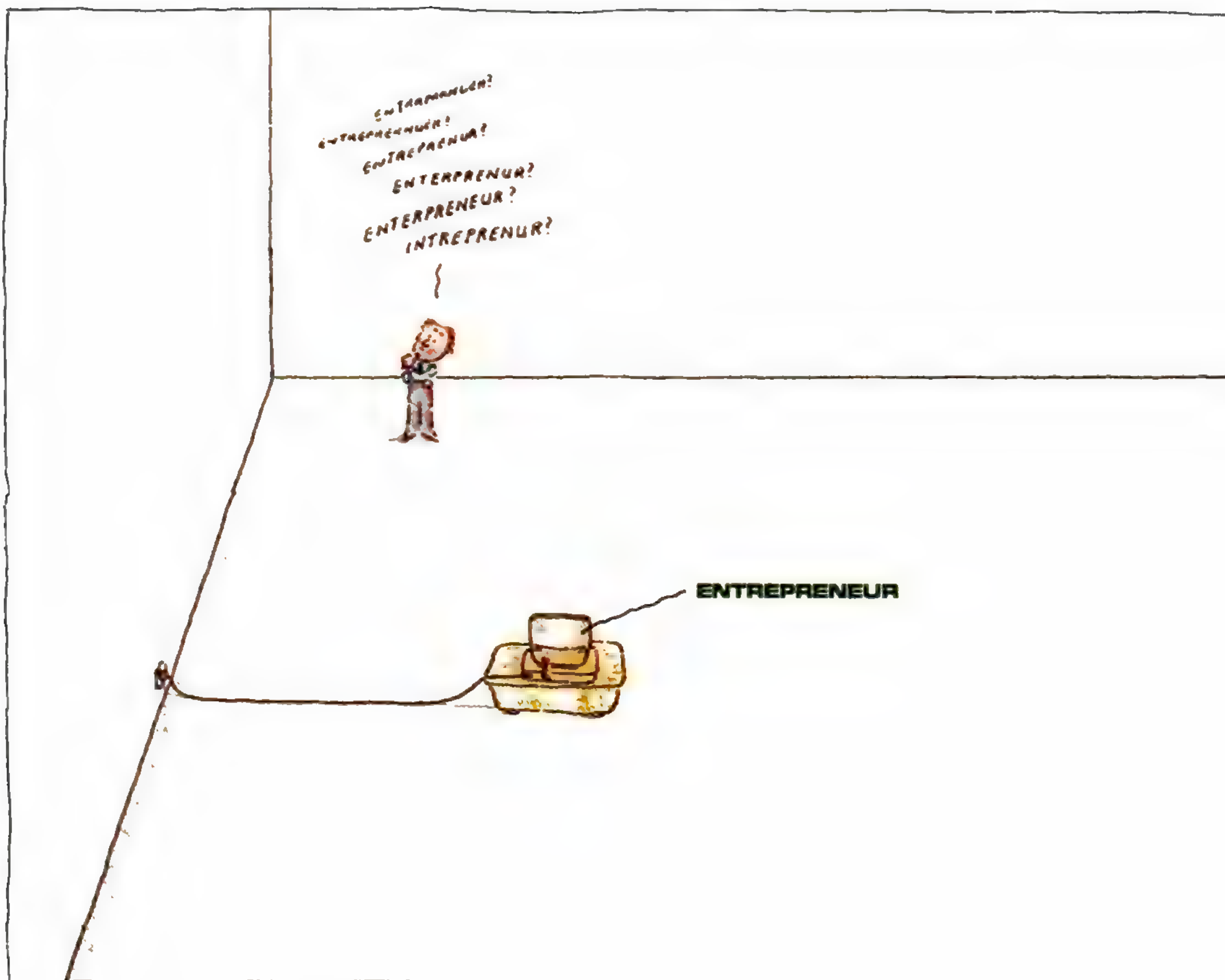
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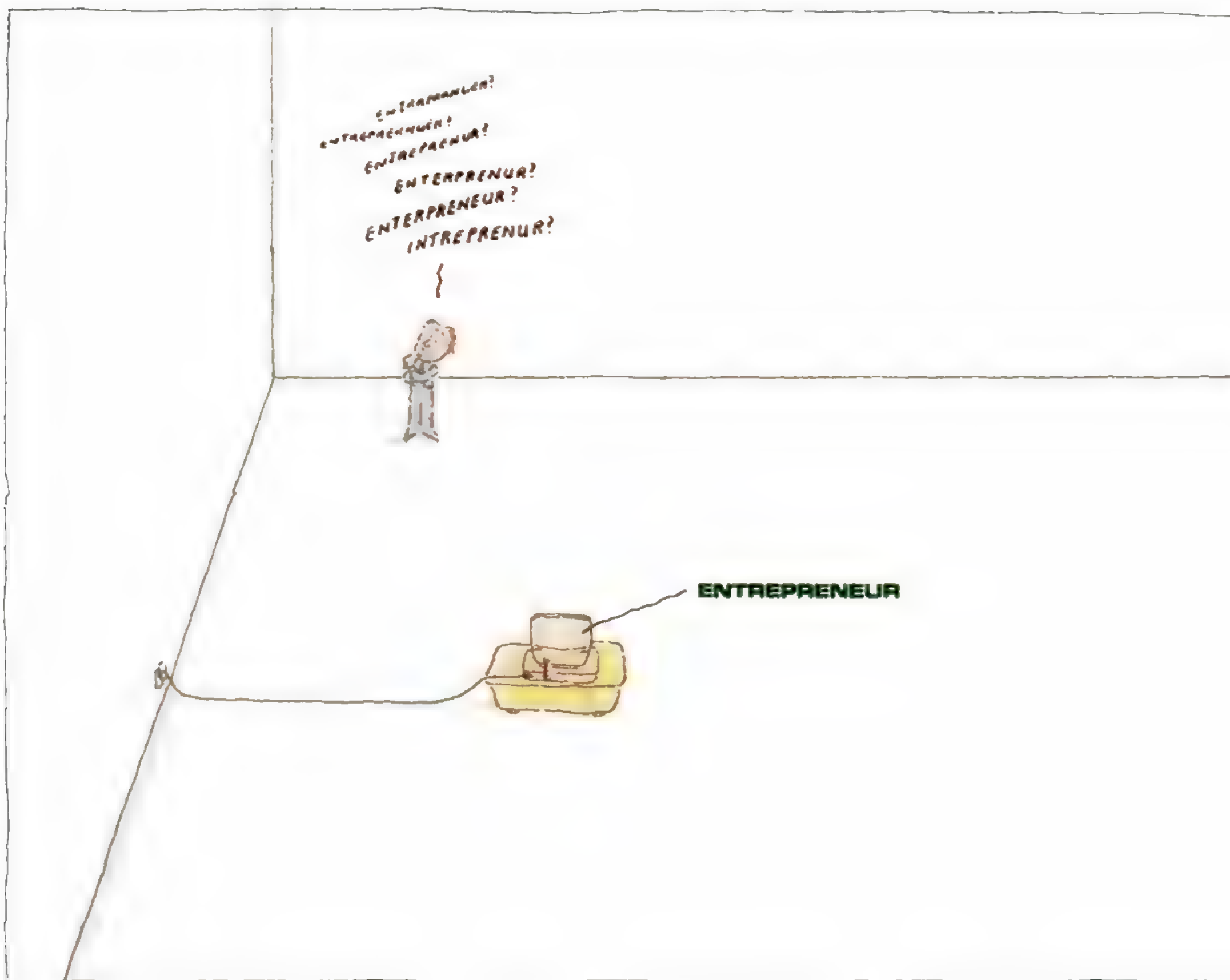
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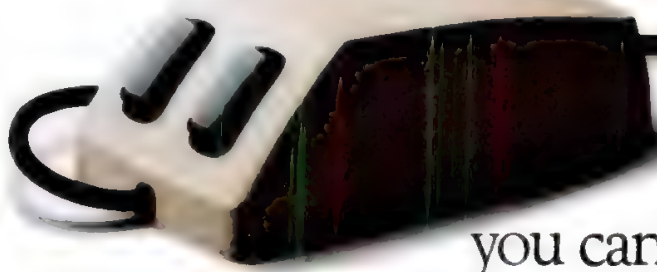
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MACROS

Powerful Tools for Micro Users

Macros are powerful tools for increasing keystroke efficiency. The macro facilities now available to nonprogrammers, however, are not necessarily efficient.

Reducing the tedium of keyboarding is every computer user's goal, but how many users know that help is available in the form of macro facilities for IBM PC software? A macro facility is a piece of software that creates, stores, and runs a keyboard macro, a series of keystrokes of varying length that can be automatically reproduced in your spreadsheet, database, or word processing text, usually with a single command. Not all macro facilities are the same, of course. They differ in the extent of the advantages they provide and in how easy they are to use.

All Pros, Few Cons

In theory, the advantages of macro use far outweigh the disadvantages. By reducing the number of keystrokes users must type, macros save time and reduce tedium, which usually reduces the margin for error caused by tedium. Suppose, for example, that you are writing a letter for your employer, which happens to be the Amalgamated Association of Beneficent Life Assurance and Equity Companies. You could spend the rest of your life typing the name of that company—if you could remember it. Or you could create a macro to do the work for you.

Suppose that as an accountant you are frustrated because *1-2-3* and *VisiCalc IV* use the numeric keypad for cursor control. Macros can help move cursor control to the function keys, so that the NumLock key can be permanently depressed for rapid data entry. Simply define a macro that contains the up-arrow key and name it F1. Pressing the F1 function key then moves the cursor up one cell. The process can be repeated for each arrow key.

Macro shortcuts have implications for training, too. Suppose that you want a clerk regularly to distill a monthly report from a large spreadsheet. Following common practice, you might first teach the clerk how to use your spreadsheet program and then have him create the report. But you could dramatically reduce the

training time by creating a macro to automatically extract and format the pertinent information. Then, instead of training the clerk to use the entire spreadsheet package, you could train him just to use the macro.

Cashing In

To realize these advantages, macros must be easy to create and run. What exactly does this mean? Macro facility ease of use depends on three factors: keystroke economy, the context in which



In theory, the advantages of macro use far outweigh the disadvantages.

a macro can be created and run, and validation, the automatic checking of the macro's accuracy. These factors make the difference between a macro facility that you will consider an ally and one that you will learn to hate.

The most significant factor is keystroke economy. A macro facility that requires you to press many keys to replace a short sequence of keystrokes clearly defeats the purpose. For instance, suppose you create a macro to replace a sequence of three keystrokes. If, on the one hand, you must type six keystrokes to run the macro, you suffer a net loss of three. On the other hand, if the macro will run with a single

keystroke, you save two.

After keystroke economy, the next most important factor is context. A macro facility that is well designed in terms of context should allow you to create macros whenever you wish. This freedom encourages the use of small, throw-away macros that can save you hundreds of keystrokes in minutes, even though you may use them 20 times in one sitting and then never again.

In terms of context, it is best, too, if the macros are independent of the host application. To embed the macro in the application invites disaster. Take, for example, Lotus' *1-2-3*, which stores macros on its spreadsheet. If you insert a row in the spreadsheet, you might, in this case, inadvertently ruin a macro. Worse still, if you carelessly delete a column containing a macro, you might devastate the remainder of the spreadsheet.

The last factor determining ease of use is validation. Some macro facilities reveal how your macro will behave before you run it. This preview is called "validation during creation," and it virtually eliminates the need to debug each macro.

Now that you understand the factors affecting ease of use, you're ready to see how each of five macro facilities measure up: the built-in facilities of *SuperCalc*³, *VisiCalc*, *1-2-3*, and *EDIX*, and an add-on, *ProKey*. The basis of comparison is a sample macro consisting of six right-arrow keys.

EDIX

Of the five macro facilities tested, the most complex and difficult to use was *EDIX*'s. Though *EDIX* is a fine text editor, its macro facility is cumbersome. The keystrokes needed to create an *EDIX* macro depend on what you are doing at the time you decide to create it. For the purposes of the test, I assumed I was in the midst of editing a document and used the following keystrokes to create the sample macro:

F3 This function key tells *EDIX* to stop editing the current document and to

open a window and a buffer in which to edit the macro.

m spacebar The m identifies this line as a macro.

r spacebar The r is the name for the macro and stands for "right." A mnemonic device, it saves the additional keystrokes required to spell out the word.

@chr *EDIX* requires that you spell out the names of any control keys that you want to embed in a macro. The right-arrow key, considered a control key, is spelled @chr, which stands for "character right."

@chr @chr @chr @chr @chr Second through sixth right-arrow keys.

Alt v This combined keystroke puts *EDIX* into a special context that the program's creators call the Extended Command mode. You must do this before configuring *EDIX* from a buffer.

config Return These six keystrokes (config) followed by a Return tell *EDIX* to absorb the new macro from the configuration buffer.

F1 This keystroke returns the cursor to the document that was originally being edited. The macro can now be used.

To create the *EDIX* macro requires 38 keystrokes; to run it, 3:

Alt v With this, *EDIX* shifts into Extended Command mode, an *EDIX* prerequisite for running a macro.

r Return key These two sequential keystrokes specify the name of the macro to be run.

Not only must you use a large number of keystrokes to create and run an *EDIX* macro, you must place its source code in a buffer or a disk file before you can configure the program to absorb the macro. If you wish to create a macro while editing a document, you must switch buffers, type the macro, configure *EDIX*, and switch back to the original buffer. Only after all this can the macro be used.

EDIX fails in terms of contextual convenience. It also fails to provide any validation of your macro during creation. Your only check is to run it, although

there is some simple syntax checking during the run.

ProKey

An add-on macro facility, *ProKey* must be attached to another program before it is of any use. The following discussion shows how to create and run the sample macro using *ProKey* in conjunction with the *EDIX* text processor.

Pay close attention. This is so easy that you may miss the action if you blink. To create the sample macro using *ProKey*,



EDIX fails in terms of contextual convenience. It also provides no validation.

type the following keystrokes:

Alt = This combined keystroke tells *ProKey* to create a macro.

Ctrl r This combined keystroke is the name of the macro.

Right-arrow key This keystroke is the first of the six right arrows.

Right-arrow key Second.

Right-arrow key Third.

Right-arrow key Fourth.

Right-arrow key Fifth.

Right-arrow key Last of the six right arrows.

Alt hyphen This combined keystroke tells *ProKey* that the macro is complete.

That's all. *ProKey* requires only nine keystrokes to create a macro containing six keystrokes, for a saving of three.

What's even better is that I was able to verify the macro's accuracy while creating it, which is known as validation during creation. Each time I pressed the right-arrow key, *ProKey* recorded the keystroke as part of the macro and then handed the keystroke to *EDIX*, which processed it just as though *ProKey* were not running. So *EDIX* moved the cursor one position to the right for each of the right-arrow keystrokes. By watching the screen as I created the *ProKey* macro, I verified the macro's accuracy before running it.

Running it involved a single keystroke combination:

Ctrl r This combined keystroke tells *ProKey* to run the macro named Ctrl r.

In contrast to *EDIX*, *ProKey* requires only 10 keystrokes to create and run the sample macro. It gives you the freedom to create a macro whenever you wish and to store it in memory independently of the application program. Because *ProKey* validates your macros as you create them, you can watch for errors on screen before running them.

Lotus 1-2-3

The Lotus 1-2-3 program is a powerful spreadsheet combined with graphics and database commands. Its macro facility offers its users additional reserves of power. The first step in tapping this reserve is to define your macro as one or more labels in a column of your spreadsheet. You use the following three steps:

1. In the words of the 1-2-3 manual, "Find some out-of-the-way cells in an empty part of the worksheet."
2. In these cells, type labels to represent the keystrokes associated with the macro.
3. Use the Range Name command to name the macro.

The reason the first step is that row insertion could split up and ruin your macro. Although you will need to expend

some keystrokes looking for and moving to the out-of-the-way cells, the precise number is not predictable. Hence these keystrokes are not included in the keystroke count.

To keep things simple, I'll assume that I am building the macro in cells S1 through S6. With the cursor at cell S1, type the following keystrokes:

{right} Return key In *1-2-3*, the seven characters {right} name the right-arrow key.

/C Return key These three sequential keystrokes tell *1-2-3* to copy the contents of cell S1, which eliminates the need to type {right} an additional five times. The keystrokes saved are substantial: a net total of 32.

Down-arrow key This and the next three keystrokes tell *1-2-3* to copy {right} into cells S2 through S6.

Period key

S6 Return key

/RNC\r Return key These seven keystrokes identify the cells as a macro, to which is attached the name r.

Return key This keystroke completes the naming of the macro, which is now ready to be used in the *1-2-3* spreadsheet.

Apart from the keystrokes needed to reach cell S1, *1-2-3* requires 24 keystrokes to create the sample macro. It ran with a single keystroke combination: Alt r.

Lotus' *1-2-3* suffers from relatively severe keystroke inflation. Many of the embedded keystrokes that its macros will reproduce when run must be spelled out. As you have just seen, if you want to embed the right-arrow key, you must type seven characters, which leads to a 600 percent keystroke inflation.

That Lotus macros are actually part of the spreadsheet as labels in the cells is a mixed blessing. The good news is that you can always examine or modify the definition of your macros, certainly a useful option. The bad news is that your macros are exposed to accidental destruction. For example, while editing the main part of your spreadsheet, you could accidentally

insert a row between two cells that define your macro.

Lotus' *1-2-3* provides no validation during the creation of your macro. You must explicitly test each macro after you create it.

SuperCalc³

SuperCalc³ is Sorcim's latest version of *SuperCalc*—basically, *SuperCalc*² plus graphics. Like *1-2-3*, *SuperCalc*³ has a built-in macro facility.

*SuperCalc*³ requires a separate disk file for each macro. If you have 31 macros, you need 31 files. Files can be created in

VisiCalc IV
preserves a history
of your most recent
75 keystrokes. Two
commands then
transform this
keystroke history into
macros.

either of two ways: with a separate program, like a text editor or a word processor, or with *SuperCalc*³ itself. To avoid introducing yet another program into this discussion, I loaded *SuperCalc*³ to create the macro file.

After loading, I followed these four steps to create the sample macro: start the program, turn off the spreadsheet border, type the keystrokes to be embedded in the macro, and write the disk to file. Each of these steps requires one or more keystrokes.

I typed the following keystrokes to create the sample macro:

Return key This one keystroke is necessary to run the program after you load it.

/GB These three keystrokes turn off the *SuperCalc*³ border.

>>>>> These five greater-than

signs represent five right-arrow keys. The reason there are only five is that *SuperCalc*³ has cursor "momentum," which causes the cursor automatically to move to the sixth position to the right on the next keystroke.

Return key This keystroke establishes that you are finished entering information in the cell. Later, when you actually run the macro, it will also push the cursor one more cell to the right.

/ODA1,Db:r.xgt Return key These 15 keystrokes write the macro to the diskette in drive B.

If I were willing to write the macro on the *SuperCalc*³ program disk (which is trapped in drive A because *SuperCalc*³ is overlaid), I could save two keystrokes by leaving off the b: in the last sequence of keystrokes. I don't like writing on program disks, and consequently *SuperCalc*³ requires 25 keystrokes to create the sample macro.

The following six keystrokes run the sample macro:

/Xb:r Return key These six keystrokes invoke the Execute command (X) and identify the file containing the macro (b:r).

The *SuperCalc*³ macro facility entails several inconveniences. Not only does it require a large number of keystrokes to create and run the sample macro, it also does not allow you to create a macro unless your spreadsheet is empty. If it is not, you must save it, start a new spreadsheet, create the macro, save it on disk, and only then resume working on the original spreadsheet. Finally, because *SuperCalc*³ provides no validation option, you must explicitly test macros after you have created them.

VisiCalc IV

VisiCalc IV is similar to *1-2-3* and *SuperCalc*³ in that it is a spreadsheet program with graphics and a built-in macro facility.

Unlike the other four programs, *VisiCalc IV* provides two methods for creating macros. The first is to define the macro

explicitly by using the Keysaver Define command. The second is to start with a history of your previous keystrokes (*VisiCalc IV* keeps track of this history automatically) and edit them to form the macro. This method compensates for its use of four extra keystrokes by performing a validation check, which method 1 does not. Because of its uniqueness, I used the second method to create the sample macro.

VisiCalc IV preserves a history of your most recent 75 keystrokes. Two commands then transform this keystroke history into macros.

The Keysaver Forget command, which erases the entire history, is useful when you decide that the next items to be typed in your spreadsheet should be saved as a macro. By using Keyboard Forget, only the macro is stored in the keystroke memory when you resume typing, not everything that was saved before. The second

command, Keysaver Recall, presents you with the keystroke history and allows you to edit it selectively. When you are finished editing, the command creates a macro. Using the Keysaver Forget command requires the following keystrokes:

/*KF These four keystrokes erase the history of the last 75 keystrokes.

Right-arrow key This keystroke is the first of the six right-arrows and moves the cursor one cell to the right.

Right-arrow key Second.

Right-arrow key Third.

Right-arrow key Fourth.

Right-arrow key Fifth.

Right-arrow key Sixth and last right arrow.

/*KR These four keystrokes tell *VisiCalc IV* to create a macro from the foregoing keystrokes. The program then asks for the name of the macro.

r This is the name of the macro. *Visi-*

Calc IV now displays the history of your most recent keystrokes, which in this example, contains six right-arrows.

Ctrl Return key This keystroke tells *VisiCalc IV* to create the *r* macro from the keystrokes in the history.

In addition to creating the macro, I validated it. While I typed, I could watch what happened on the screen. Each time I pressed the right-arrow key, the cursor moved one cell to the right. If I had made a mistake, such as pressing the wrong key or pressing too few right-arrows, I would have seen the mistake before I recalled the keystrokes to create the macro. This ability merely to recall a macro rather than define one allows you to experiment. You can try your keystrokes without committing yourself, and only when you like the results do you recall the keystrokes and make a macro.

To run the sample macro, just press Alt *r*. *VisiCalc IV* requires 16 keystrokes to create the sample macro. It requires just one to run it.

ProKey and *VisiCalc IV* provide macro facilities that nonprogrammers can use easily. Both facilities are frugal with keystrokes and both help users find errors before the macro is run. If you want to start using macros, these two programs are worth investigating.

Lotus' *1-2-3* and *SuperCalc*¹ provide macro facilities that programmers are likely to enjoy. Although they do not offer macro validation, they do help reduce tedium by permitting the construction of long, efficient macros. If you own either of these programs, try playing with the macro facility. If you don't like it, you can always replace it with *ProKey*.

EDIX's macro facility is too difficult to use. But I like its text editing, so I didn't scrap the entire program. Instead, I amputated *EDIX*'s macro facility and grafted *ProKey* in its place. The result is a good text editor with a good macro facility. ■

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Rating the Macro Facilities: A Summary

Facility	Keystroke economy ^a		Context		Validation ^d
	Create sample	Run sample	Circumstances of creation ^b	Independence from application ^c	
ProKey	9	1	Good	Good	Yes
VisiCalc IV	16	1	Good	Good	Yes
1-2-3	24	1	Fair	Poor	No
SuperCalc ¹	25	6	Poor	Good	No
EDIX	38	3	Poor	Good	No

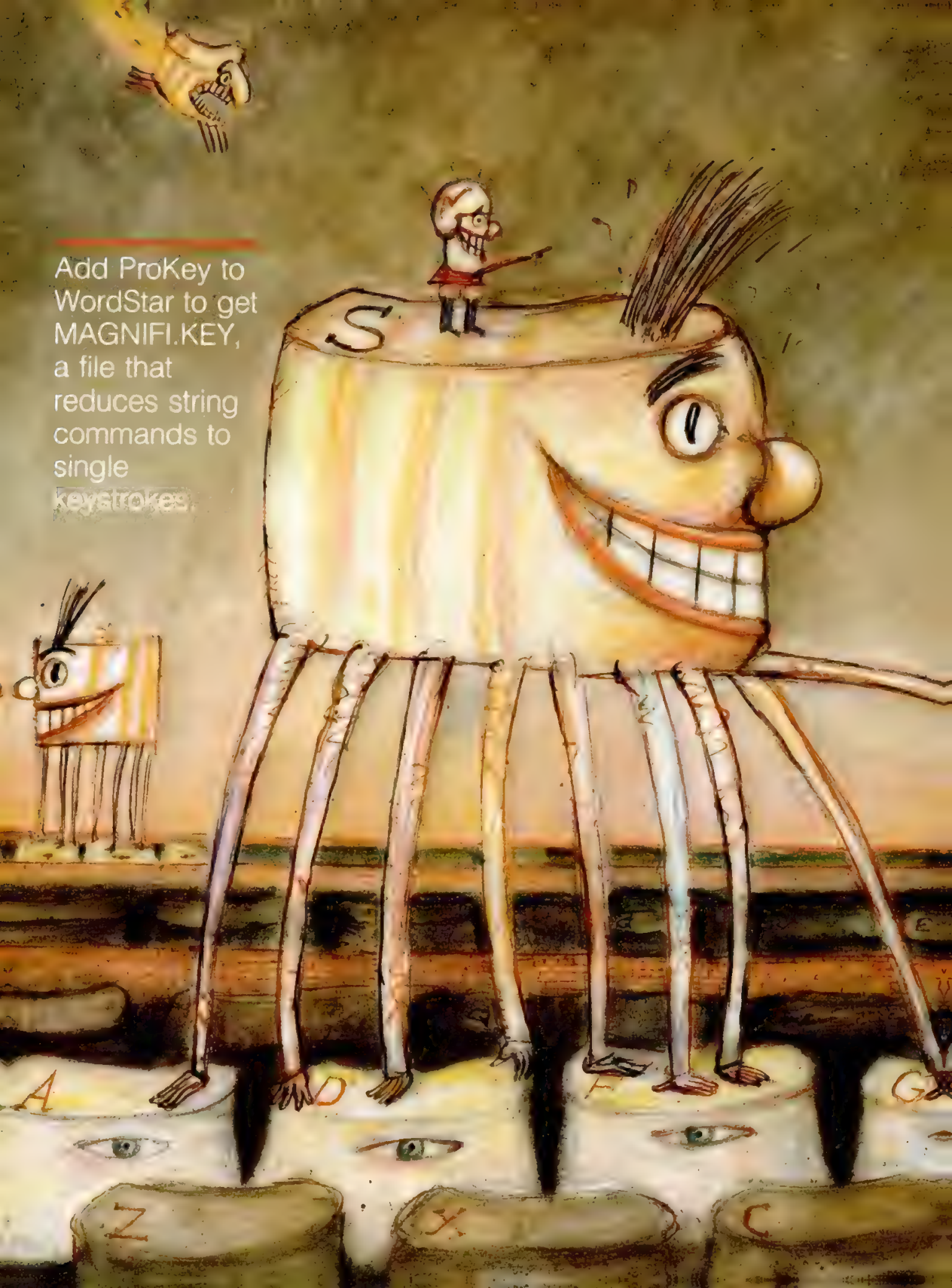
^aKeystroke economy refers to how many keystrokes were needed to create the sample macro and how many to run it. In each case, the fewer keystrokes, the better.

^bThe circumstances of macro creation are rated as follows: *Good* means that you can create a macro whenever you wish; *Fair* means that before creating a macro, you must search the spreadsheet for out-of-the-way cells in which to build it; *Poor* means that if you are in the midst of creating a spreadsheet or document, you cannot also create a macro without first saving your work.

^cA macro facility's independence from the application program is rated as follows: *Good* means that macros are well isolated from the application. When creating or editing a macro, you can not easily damage the spreadsheet or document. Conversely, working on the spreadsheet or document involves few risks of damage to your macros. Finally, you can easily use the same set of macros with more than one document or spreadsheet. *Poor* means that because they are stored as part of the document or spreadsheet, when you edit your macros, you can easily damage the document or spreadsheet—and vice versa. Furthermore, if you want to use the same collection of macros with more than one document or spreadsheet, you must first explicitly duplicate the collection of macros into the new documents or spreadsheets.

^dValidation permits you to preview how your macro will work before you run it. If the column says "No," count on spending more time explicitly testing your macros.

Add ProKey to
WordStar to get
MAGNIFI.KEY,
a file that
reduces string
commands to
single
keystrokes.



COVER STORY / JUDITH EPSTEIN

MAGNIFI. KEY

Madagascar: The Out of Words Show

Illustration: Andrew Stachurs





t the time I bought my computer in 1982, there were only two word processing programs available for the PC.

After spending several hours at my local computer store reading the *WordStar* training guide, I decided to purchase *WordStar*.

The guide promised a lot, but I soon began reading articles about new word processing programs that did more than *WordStar*. They used 40 function keys. They could mark words, lines, sentences, and paragraphs with just one keystroke. They could print information without first saving it to disk. Surely all this could be done with *WordStar*, too.

I set to work combining *WordStar* and *ProKey*, RoseSoft's program for customizing the PC keyboard, to create the file MAGNIFI.KEY, which contains redefinitions for most keys. With these *ProKey* definitions, *WordStar* command strings can be accessed with two-key combinations. For example, to address an envelope directly from the letter that is being edited, all you have to do is press Alt-E. Your return address and the recipient's address will automatically be placed on the envelope.

I have defined all the function keys, all the numeric and alphabetic keys, and several other keys, such as the Backspace and PgUp keys, in the Alt state. The keystrokes that are required for each *ProKey* definition, as well as the effect of each definition, are described below. It would be wise to try out each series of keystrokes before you use the *ProKey* setup so you're sure what each redefined key does. Since I have not redefined any of the Ctrl-key combinations, *WordStar*'s features can still be accessed normally.

As shown in the "Cursor Normal" section of Figure 1, the unshifted state of the function keys controls cursor movements. These definitions make it possible for you to position the cursor and delete text relative to the cursor with one keystroke rather than two.

The Ctrl-Function key combinations

shown in the "Blocks & Files Control" section of Figure 1 are redefinitions that have replaced three *WordStar* keystrokes with two.

I have also created new definitions for the Alt-Function key combinations. Alt-F1 allows you to save your work on the logged drive and continue to work. It then returns the cursor to the proper location instead of placing it at the beginning of the file. Alt-F2 will reform a document from the beginning to the end of the file at the fastest speed according to the current mar-



It would be wise to try out each series of keystrokes before you use the *ProKey* setup.

gins. Alt-F3 will save your file on the logged drive and then print the file. This command is useful when you have edited only one file and wish to print it several times. Since the command uses the 'R' command, which allows you to repeat a previous response to a question, it is only good as long as the previous response is the desired one. It also prints the file with all default options. Alt-F4 will reform the paragraph in which the cursor is located and place the cursor at the beginning of the paragraph. (Paragraphs must be single-spaced with two carriage returns at the end of each paragraph for this command to work. Also, it will not work with the first

paragraph of a file unless the paragraph is preceded by two carriage returns.) Alt-F5 saves the current file on drive C to drive B. It is the same as the ALT-R command.

The margin specifications that are accessed by the Alt-F7, -F8, -F9, and -F10 combinations allow you to have a paragraph of normal text and a paragraph of condensed, double, or condensed double-width printing within the same margins. This means that if regular printing starts 1 inch from the left margin and ends 1 inch from the right margin, then so will condensed printing, double-width printing, and condensed double-width printing. I have determined what these margin numbers should be for the Epson printer through trial and error. If you have a different printer, you may need to experiment to find the best margins.

The normal *WordStar* definitions of the cursor movement keys were not changed (see the "Keyboard Normal" section in Figure 1). But using the Ctrl key with the cursor movement keys gives several options, as shown in Figure 1 under "Keyboard Control." Pressing the Ctrl key in combination with the left arrow key finds a string to the left and above the cursor; the Ctrl-right arrow key combination finds a string to the right and below; Ctrl-PgUp finds and replaces a string globally, Ctrl-PgDn finds and deletes a string globally, Ctrl-Home will find the start of a paragraph, and Ctrl-End will find the end of a paragraph in which the cursor is located (if the paragraphs are single-spaced).

Ctrl-Backspace will delete carriage returns that appear in the middle of a paragraph. When you have deleted the required number, just type Alt-F4 (or 'B) to reform the paragraph. Ctrl-\ will transpose the character above the cursor and the character to the left. Ctrl-2 will send a marked block to the end of the file. This is useful for reordering text or making short notes to yourself and collecting them at the end of the document. It will reform the remaining text according to the current margins.

As shown in the "Keyboard Normal"

section of Figure 1, the Backspace key will delete the character to the left of the cursor and the Del key will delete the character above the cursor. The backtab, obtained by pressing the Shift-Tab key combination, will place the character ^H in the file, which is the *WordStar* command to backspace and overprint a character.

Alternate Uses of the Alt Key

Figure 2 shows the series of *WordStar* keystrokes defined, in *ProKey*, by each combination of the Alt key and an alphabetic or numeric key. When using *WordStar*, I usually do all my work on RAMdisk C while keeping *WordStar* on RAMdisk C. In order to use the RAM drive, a file must be opened with Alt-D or Alt-N (instead of just D or N). This sets the value of Alt-A to the name of the file and logs you onto drive C. Pressing Alt-R (or Alt-F5) then allows the current text on drive C to be sent to drive B for saving on disk, and should be used often. If you're editing a new file, Alt-O must be used to put the name on drive B for the first time before Alt-R can be used for backup. It is a good idea to use Alt-O immediately upon opening a new file. If the file already exists on B then you can use Alt-G (rather than Alt-O) to get it from drive B and put it onto the newly opened file on drive C. This method puts each new saved version of the file onto the same file, and thus no backup file is created on B. If you are working with a hard disk and do not have drive B, be sure to change all commands that reference drive B to drive A, that is Alt-E, -G, -K, -R, -T, -O, and -F5. Since some of these commands use and erase the place marker O, don't use ^K0 or ^Q0. You may use any of the other place markers from 1 to 9.

Alt-W, Alt-L, Alt-S, or Alt-P will mark a word, line, sentence, or paragraph, respectively. Alt-C, Alt-V, or Alt-Y will copy, move, or delete a marked block, respectively, and reform both the source and destination blocks, leaving the cursor at the destination.

The printer controls of Alt-B, -I, -X,

-1, -2, -H, and -U will surround the text to give you boldface, italics, emphasized, superscripts, subscripts, headings, and underlining, respectively. For example, to create a heading that is centered, bold-faced, and underlined, just type Alt-H, the text of the heading, and type return. The command will place the heading in the center surrounded by the boldface and underline printer commands, that is,

```
^B^TThis is a heading^T^B
```

These printer commands are ones that I



Alt-F3 is useful
when you have
edited only one file
and wish to print
it several times.

patched for my Epson printer. Thus, I use ^PT for continuous underlining. If you do not have the continuous underlining feature, then be sure to use ^PS. The script commands that I use are ^PQ for superscripts on, ^PW for subscripts on, and ^PR for both scripts off. If you use superscripts and subscripts as defined by *WordStar*, be sure to change Alt-1 to ^PT for both on and off of superscripting, and change Alt-2 to IIV for both on and off of subscripting.

Alt-O lets you create a ruler line. Just type Alt-O, create the line, and press the Return key. The command will set the new ruler line and position you on the next line. Alt-3 and Alt-4 will set the left and

right margins at the current cursor position.

If you would like to print the current file but not store it in a permanent file, then type Alt-T. This places the current file in a buffer called T.QQQ on drive B and prints it with all default options. If no file T.QQQ exists on drive B, then you must use Alt-K the first time. If you would like to type an envelope from the current file, just position the envelope in the printer and place the cursor anywhere in the recipient's address on the letter and type Alt-E. (This command assumes there is a blank line before and after the recipient's address.) The return address will be taken from whatever definition you have stored in Alt-J. Again, the buffer file T.QQQ on drive B will be printed. (If you do not have a drive B, be sure to change these commands to access drive A.) Alt-5 allows you to enter a date. Just type the month and day, hit the Return key, and then type the last 2 digits of the year. (The 19 is entered by the command.)

For those of you who type manuscripts, I have a way of entering footnotes within *WordStar*. Just type Alt-F. The command will wait for you to enter a number that will be superscripted. When you press the Return key, the superscript command will be turned off, and you can then type the author's name, hit Return, and a comma and the underline command will turn on. You can then type the title of the book, hit Return, and the underline command will turn off and a comma will be entered. Then you can type the publisher's name, hit Return, and another comma will be entered. Type the publisher's location, hit Return, and 19 will be entered. Then enter the last 2 digits of the date. At this point, a single quotation mark (') will be placed at the end of the footnote. The footnote can be left in the text for later removal, or it can be found with Alt-6 and sent to the end of the file immediately. If Alt-6 is used, the command will search for the ' and remove it, move the footnote to the end of the file, and reform the paragraph from which it was deleted. If you do not use

Alt-6 to find the footnote, then remember to remove the quotation mark. The Alt-F command uses the printer controls that I patched for my own Epson printer. If your underline command is ^PS and your script commands are ^PT and ^PV, remember to change the definition accordingly.

Alt-Q and Alt-Z are used for entering quotes within double-spaced text. Alt-Q will reset the margins to 11 and 55 with single-spacing and enter two carriage returns. You can then type in the quote. Typing Alt-Z will reset the margins to 1 and 65 with double-spacing.

The Alt-7, -8, and -9 and Ctrl-6 combinations are still available for use. Perhaps they could be used to enter boilerplate text or perform some function that has not been accounted for here. You may define them in *ProKey* by typing the Alt= combination, typing in the key definition, and then pressing the Alt and hyphen (-) keys simultaneously. Press the

Ctrl and hyphen keys simultaneously to toggle a variable field. Use Ctrl-] to toggle a fixed field. Use Ctrl-Esc to abort a definition or playback. (See the *ProKey* manual for a detailed explanation.)

Most of these key definitions will become clear once you have tried them.

Making It All Happen

In order to make the operation of *WordStar* automatic, I use an AUTOEXEC.BAT file to boot the disk. The AUTOEXEC.BAT file for *WordStar* version 3.24 is printed in Figure 3a; the file for *WordStar* version 3.3 with DOS 2.0 is shown in Figure 3b.

The file WSKY.PRO, detailed in Figure 4, and DOSKY.PRO, in Figure 5, must be input exactly as shown to define the keys as described here. They contain all the *ProKey* definitions to replace strings of *WordStar* key commands. Make sure these are ASCII files. (If you can read

ALTERNATE KEYS [WordStar keynotes]
A [set from <e> or <A>
B PB PB
C KO KC B GV B GO KO KM
D LC<R>D<e>A>R
E 'OF N N<R> R - KM OF N N<R> B R KB
MY O R/ O P R/ PD O R / <e>V R R R R R R PO JO
'KM B T QOQ R V KM 'KV'KP B T QOQ/ESC
F 'PB 'PR 'PT 'PT,
G 'MB /e>A>R>
H <R>'PB'PT 'PT'PB'OC W
I 'PE4 'PE3
J <R>COMPTICS<R>Judith R Epstein<R>3303 Date Ave <R>
Highland Park IL 60035/R
K 'MBB 'MKR 'MBB T QOQ<R>I'Y'KM
L 'OS'KB 'KM
M 'KM
N LC<R>'N<e>A>R
O 'OL I R OR124 R 'OS N 'PM<e>ulerline DF OS
P 'OF'N N<R>B<R>I'KB'Q'N'N<R><R>'KM'QB
Q <R>R OL11/R 'OR55 R 'OS1<R>
R 'KO'QR'KB'QC'KM'KMB <e>A>R>Y'KM'GO KO
S 'OF R B/R - 'OF D R /R KB OF R R KM QB
T 'QR KB QC'KM KMB T QOQ<R>Y'KM KP B T QOQ<R>'esc'
U 'PT 'PT
V 'KO'KV'GV'B'GO'KO'KM'B
W F KM A'KB
X 'PEE 'PEF
Y QB KY B
Z R<R>R 'OL1'R OR63'R 'OS2
1 PQ 'RR
2 PM PB
3 OL <e>R>
4 'OR<esc>
5 19
6 'QA'<R> <R>N R<R>'KM'OF'P'Q<R>B/R'KB<e>tr12>
7
8
9 'MBB 'MKR'KMB <e>A>R>I'Y'KM

Figure 2: *Using ProKey definitions, these combinations of the Alt key and an alphabetic or numeric key can replace the WordStar command strings shown here. A caret (^) signifies pressing the Ctrl key. The less than (<) and greater than (>) signs bracket two-key combinations and should not be typed; for instance, <aD> stands for the Alt-D combination. <R> represents the Return key; <esc> stands for the Esc key. "Rulerline" refers to the ruler line that must be typed in. Its use is described in the text.*

the file by using the TYPE command under DOS and do not see any strange characters, then the file is ASCII.) Either type the definitions using the Alt-N option, or save this portion to a file and then use a program that will remove the high order bits that *WordStar* sets.

The DOSKY.PRO and WSKY.PRO files, when combined with the AUTOEXEC.BAT file, will save you lots of keystrokes in your day-to-day use of *WordStar*. Once you try these *ProKey* definitions, you may find other ways to customize *WordStar* to suit you. ■

Judith Epstein is a programmer who has spent considerable time modifying WordStar on her PC.

[illegible]

Figure 1: This table summarizes the effect of the Function keys and other keys after they have been redefined with ProKey.


```

      This is wordstar disk version 3 24*
free4/s
PROKEY /C
PROKEY DOSKY PRO/R
    use alt F9  to enter date xx-xx-xx
    use alt F10 to enter time xx.xx xx
    (key will enter - and )
Date
Time
PROKEY WSKY PRO/R
    WS operating files will be copied to ramdisk C
copy A ws* com c
copy A * ovr C
copy A chkdsk com c
sd c /e
    SpellStar dictionary is on A
    [If you have enough room on C , put dictionary on C too]
pause Insert Data Diskette into drive B
CHKDSK B
SD B /E
pause Insure sufficient room on Data Diskette Double file size needed
B
C:WS
A
PROKEY DOSKY PRO/R

```

```

WORDSTAR version 3 3 (Sept 26, 1983)
VDISK is ram drive program, set up from CONFIG SYS,
                                where DEVICE=VDISK COM
PROKEY /C
PROKEY DOSKY PRO/R
    use alt F9  to enter date xx-xx-xx
    use alt F10 to enter time xx.xx xx
    (key will enter - and )
Date
Time
PROKEY WSKY PRO/R
    WS operating files will be copied to ramdisk C
copy A ws* com c
copy A * ovr C
copy A chkdsk com c
sd c /e
    SpellStar dictionary is on A
    [If you have enough room on C , put dictionary on C too]
pause Insert Data Diskette into drive B
CHKDSK B
SD B /E
pause Insure sufficient room on Data Diskette Double file size needed
B
C:WS
A
PROKEY DOSKY PRO/R

```

Figures 3a and 3b: These AUTOEXEC.BAT files create the RAM drive, copy the necessary programs to drive C, check to see that there is enough space on the disk in drive B, set the keys for ProKey, log onto drive B, and run WordStar from drive C. Figure 3a is the file for WordStar version 3.24; 3b is for version 3.3. When WordStar is exited, the AUTOEXEC.BAT file takes over, sets the function keys to be useful within DOS, and logs back on to drive A.

Of the files referred to on the AUTOEXEC.BAT, FREE4.COM is the RAMdisk program and SD.COM is a sorted directory program. FREE4.COM, PROKEY.EXE., DOSKY.PRO, WSKY.PRO, CHKDSK.COM, SD.COM, and all WordStar files should be on drive A.

Hints for WordStar

These timesaving tips will make formatting your documents a snap.

While creating keyboard definitions and reading books about WordStar, I discovered that WordStar could make word processing even easier than the manual let on. Here is a compilation of hints, keystrokes, and timesaving features that I've been using.

Throughout this article, I'll use a caret (^) to refer to the Ctrl key, <R> to mean the Return key, and <Esc> for the Esc key.

Quick Commands

When first entering a file, force the entire file into the computer's memory by using the ^QC (end of file) command to put the cursor at the file's end. Subsequent jumping around within the file will not cause delays for disk access to fetch text (unless the file is very long).

If you enter the wrong cursor command, you may find yourself quite a distance from where you wanted to go. Use ^QP to move the cursor back to where it was before you entered the erroneous command.

Use ^QQ to speed up commands. It means "repeat next command until interrupted." Thus ^QQ^B means to reform continuously from the cursor position. You can also control the speed of the continuous command by adding a number from 1 (fastest) to 9 (slowest); 3 is the default speed. For instance, ^QQ^B1 will give you the fastest reforming action. You can change the speed at any time by entering a new number. Any key other than a number key will stop the action completely.

To reform everything from the beginning of the document, use ^QR ^QQ^B1. ^QD scrolls to the right in segments. In very wide documents, it is necessary to enter this command several times before reaching the end of the line. On the other hand, ^QS returns to the beginning of a line in a single step.

When using the ^QA or ^QF options, a previous response can be retrieved by typing ^R.

Return and Tabs

When insertion is turned off, <R> moves the cursor down the screen without adding any blank lines to the text. But if you are in a line marked by a soft return flag (which shows up as a blank on the screen in the column furthest to the right), <R> will change the soft return to a hard return. You will see the < symbol at the right edge of the screen. Even though this does not reposition the text, it will interfere with future editing and reforming of that line.

Tab stops can be used to make entering tabular data easier. Remove all tab stops with ^ONA, then reset the necessary ones. As you enter the data, just use the Tab key to move to the proper column. It is not necessary to press <R> at the end of each line; instead, press the Tab key at the end of a line and the cursor will automatically move to the first Tab position on the next line.

When insertion is on, the Tab key moves everything to the right of the cursor a corresponding tab stop distance to the right, and the cursor stops at the first tab stop it reaches. When insertion is turned off, pressing the Tab key does not reposition words, but merely moves the cursor to the column where the tab stop is located.

When using the paragraph tab ^OG to

```
<alt><altb>
PROKEY DEFINITIONS OF WORDSTAR KEYS (WSKY.PRO) Oct. 13, 1983<alt->
*
<alt><altb>
<ctrlp>b<vfid>...<vfid><ctrlp>b<alt->
*
<alt><altc>
<ctrlk>O<ctrlk>c<ctrlb><ctrlq>v<ctrlb><ctrlq>O<ctrlk>O<ctrlk>h<alt->
*
<alt><altd>
lc<center>d<alt><alta>...<alt-><center><alt->
*
<alt><alte>
<ctrlq>f<ctrlin><ctrlin><center><center><left><ctrlk>k
<ctrlq>f<ctrlin><ctrlin><center>b<center><dn>
<ctrlk>b.mb O<center>.op<center> po O<center>
<altj><center><center><center><center><center><center>.po 30
<ctrlk>ub: t. qqq<center>V<ctrlk>k<ctrlk>y<ctrlk>pb: t qqq<esc><alt->
*
<alt><altf>
<ctrlp>q<vfid>...<vfid><ctrlp>r <vfid>...<vfid>, <ctrlp>t
<vfid>...<vfid><ctrlp>t, <vfid>...<vfid>, <alt5>'<alt->
*
<alt><altg>
<ctrlk>rb: <alta><center><alt->
*
<alt><alth>
<center><ctrlp>b<ctrlp>t<vfid>...<vfid><ctrlp>t<ctrlp>b<ctrlp>c<center>'<alt->
*
<alt><alti>
<ctrlp>e4<vfid>...<vfid><ctrlp>e5<alt->
*
<alt><altj>
<center>COMPTICS<center>Judith R. Epstein<center>3303 Dato Avenue<center>
Highland Park, IL 60035<center><alt->
*
<alt><altk>
<ctrlk>bb<ctrlk>k<center><ctrlk>ub: t. qqq<center><up><ctrlq><ctrlk>h<alt->
*
<alt><altl>
<ctrlq>s<ctrlk>b<dn><ctrlk>k<alt->
*
<alt><altm>
<ctrlk>n<alt->
*
<alt><altn>
lc<center>n<alt><alta>...<alt-><center><alt->
*
<alt><alto>
<ctrlp>ll<center><ctrlp>r124<center><ctrlq>s<dn><ctrlin>..<ctrlp>m<vfid>...<vfid>
<ctrlq>s<dn><alt->
*
<alt><altp>
<ctrlq><ctrlf><ctrlin><ctrlin><center>b<center><dn><dn><ctrlk><ctrlb>
<ctrlq><ctrlf><ctrlin><ctrlin><center><center><ctrlk>k<ctrlq>b<alt->
*
<alt><altq>
<center><center><ctrlp>lll<center><ctrlp>r55<center><ctrlp>sl<center><alt->
*
<alt><altv>
<ctrlk>O<ctrlq>r<ctrlk>b<ctrlq>c<ctrlk>k<ctrlk>ub: <alta><center>y
<ctrlk>h<ctrlq>O<ctrlk>O<alt->
*
<alt><alts>
<ctrlq>f. <center>b<center><rgt><rgt><ctrlq>f<ctrlp> <center><center><left><ctrlk>b
<ctrlq>f <center><center><left><ctrlk>k<ctrlq>b<alt->
*
<alt><altt>
<ctrlq>r<ctrlk>b<ctrlq>c<ctrlk>k
<ctrlk>ub: t. qqq<center>y<ctrlk>h<ctrlk>pb: t. qqq<center><esc><alt->
*
<alt><altu>
<ctrlp>t<vfid>...<vfid><ctrlp>t<alt->
*
<alt><altv>
<ctrlk>O<ctrlk>v<ctrlq>v<ctrlb><ctrlq>O<ctrlk>O<ctrlk>h<ctrlb><alt->
*
<alt><altw>
<ctrlp><ctrlk>k<ctrlp><ctrlk>b<alt->
*
<alt><altx>
<ctrlp>eE<vfid>...<vfid><ctrlp>eF<alt->
*
<alt><alty>
<ctrlq>b<ctrlk>y<ctrlb><alt->
*
<alt><altz>
<center><center><ctrlp>ll<center><ctrlp>r65<center><ctrlp>s2<alt->
*
```

(continued)


```

<alt=><alt1>
<ctrlp>q<vfid> <vfid><ctrlp>r<alt->
*
<alt=><alt2>
<ctrlp>w<vfid>...<vfid><ctrlp>r<alt->
*
<alt=><alt3>
<ctrlp>l<esc><alt->
*
<alt=><alt4>
<ctrlp>r<esc><alt->
*
<alt=><alt5>
<vfid>...<vfid> 19<ffid>...<ffid><alt->
*
<alt=><alt6>
<ctrlp>a<enter> <enter>n<enter><left><ctrlp>k
<ctrlp>f<ctrlp><ctrlp><enter>B<enter><ctrlp>b<ctrlp>12>
<alt->
*
<alt=><alt7>
<vfid>...<vfid><alt->
*
<alt=><alt8>
<vfid>...<vfid><alt->
*
<alt=><alt9>
<vfid>...<vfid><alt->
*
<alt=><alt10>
<ctrlp>bb<ctrlp>k<enter><ctrlp>wb<alt><enter><up><ctrlp><ctrlp>h<alt->
*
<alt=><f1><ctrlp>s<alt->*<alt=><f2><ctrlp>d<alt->
*
<alt=><f3><ctrlp>a<alt->*<alt=><f4><ctrlp>f<alt->
*
<alt=><f5><ctrlp>n<ctrlp><alt->*<alt=><f6><ctrlp>y<alt->
*
<alt=><f7><ctrlp>a<ctrlp><alt->*<alt=><f8><ctrlp>t<alt->
*
<alt=><f9><ctrlp>r<alt->*<alt=><f10><ctrlp>c<alt->
*
<alt=><ctrlp>f1<ctrlp>b<alt->*<alt=><ctrlp>f2<ctrlp>k<alt->
*
<alt=><ctrlp>f3<ctrlp>v<alt->*<alt=><ctrlp>f4<ctrlp>c<alt->
*
<alt=><ctrlp>f5<ctrlp>y<alt->*<alt=><ctrlp>f6<ctrlp>j<alt->
*
<alt=><ctrlp>f7<ctrlp>r<alt->*<alt=><ctrlp>f8<ctrlp>w<alt->
*
<alt=><ctrlp>f9<ctrlp><ffid>.<ffid><alt->
*
<alt=><ctrlp>f10<ctrlp><ffid>.<ffid><alt->
*
<alt=><capsf1><ctrlp>a<alt->*<alt=><capsf2><ctrlp>n<alt->
*
<alt=><capsf3><ctrlp>e4<alt->*<alt=><capsf4><ctrlp>e5<alt->
*
<alt=><capsf5><ctrlp>eE<alt->*<alt=><capsf6><ctrlp>eF<alt->
*
<alt=><capsf7><ctrlp>y<alt->*<alt=><capsf8><ctrlp>t<alt->
*
<alt=><capsf9><ctrlp>b<alt-><alt=><capsf10><ctrlp>g<alt->
*
<alt=><altf1><ctrlp>s<ctrlp>p<alt->*<alt=><altf2><ctrlp>r<ctrlp>q<ctrlp>1<alt->
*
<alt=><altf3><ctrlp>dp<ctrlp><esc><alt->
*
<alt=><altf4><ctrlp>f<ctrlp>n<ctrlp><enter>b<enter><dn><dn><ctrlp><ctrlp>p<alt->
*
<alt=><altf5><ctrlp>0<ctrlp>r<ctrlp>b<ctrlp>c<ctrlp>k
<ctrlp>wb.<alt><enter>y<ctrlp>h<ctrlp>0<ctrlp>0<alt->
*
<alt=><altf6><ctrlp>s<ffid>.<ffid><alt->
*
<alt=><altf7><ctrlp>11<enter><ctrlp>r65<enter><ctrlp>16<enter><ctrlp>111<enter>
<ctrlp>n15<enter><ctrlp>n4<enter><ctrlp>n8<enter><alt->
*
<alt=><altf8><ctrlp>17<enter><ctrlp>r118<enter><ctrlp>115<enter><ctrlp>n11
<enter><ctrlp>n4<enter><ctrlp>n6<enter><ctrlp>n8<enter><alt->
*
<alt=><altf9><ctrlp>11<enter><ctrlp>r33<enter><ctrlp>14<enter><ctrlp>111<enter>
<ctrlp>n6<enter><ctrlp>n15<enter><ctrlp>n8<enter><alt->
*
<alt=><altf10><ctrlp>14<enter><ctrlp>r59<enter><ctrlp>18<enter><ctrlp>111
<enter><ctrlp>n6<enter><ctrlp>n4<enter><ctrlp>n15<enter><alt->
*
<alt=><^left><ctrlp>f<vfid>...<vfid><enter>b<enter><alt->
*

```

(continued)

set a temporary margin, make sure to enter new ^OG commands for the first line of each new paragraph. Pressing <R> at the end of the paragraph removes the ^OG setting. In addition, use ^PO commands to enter hard spaces after letter or number headings in an outline. If you don't, soft spaces may disturb the alignment of text.

If you use paragraph tabs while reforming text, position your cursor to the right of the tab settings and then enter the required number of ^OGs. (This is necessary because reforming starts either at the cursor position or the new temporary left margin, whichever is further left. If ^OG starts at a cursor position that is to the left of the left margin, it will move whatever character it is on to inside the temporary margin.)

Hyphens

If WordStar's hyphen-help feature separates a word at the wrong place, delete the hyphen, use the cursor movement key to move left or right, and insert a new hyphen. But be careful when moving right: If you move beyond the right margin, the prehyphen part of the word will be too long, and the entire word will appear on the next line.

Soft hyphens are entered by hyphen-help or when using the soft hyphen entry command ^OE. Soft hyphens will print only when positioned at the end of a line. Type ^P- to enter a hard hyphen when soft hyphen entry is on.

After typing a document, you may want to ensure that certain words will be hyphenated at specific syllables during editing and paragraph reforming. Instead of entering soft hyphens throughout the original entry, you can save time by combining ^OE (soft hyphen toggle) with the ^QA replacement command.

Turn on the soft hyphen entry and enter the command `^QA thislongword <R> this-long-word <R> GN <R>`. The computer will find each word and make the softly hyphenated substitution.

Saving

To save and continue work without having the cursor move to the

top of the screen, position the cursor where you will want to continue and type `^KS^QP`. After the save has been completed, the cursor will automatically return to its previous position.

To verify the status of any `^O` toggle, enter `^O` with the help level set at 2 or 3. Each command will show its present status capitalized and in bright light. These

`^O` toggles survive both `^KS` and `^KD` commands.

Place Markers

Place markers can be set with the command `^K` and a number between 0 and 9. They can be located with `^Q` and the corresponding number. Place markers survive the `^KS` command, but they are erased by the `^KD` and `^KX` commands. Thus they are not saved with your files. A marker can be repositioned by entering its command from a new location.

You can use your own place markers that will survive the storing commands by using the nonprinting dot command line. Thus `.. @1**** SPECIAL MARK FOR CHAPTER 1` entered with the `..` positioned in column 1 will not print, but will remain in your file for subsequent saves. The `@1` can be searched for by the `^QF` or `^QA` options.

Block Moves

To reorder text within a file, the basic method is to mark a block and move it to the end of the file; this is done in two steps. First, move material that you want to be in the middle of the document to the end. Then start at the beginning again and move any text that you want to appear at the end of the document to the end of the file. The material that you haven't moved will stay at the beginning.

To send marked text to the end of the file and reform the remaining text, use `^QC<R>^KV^B^QV^KH^B`.

To move, copy, or delete marked blocks, reform what is left behind, and leave the cursor at its destination, use the following commands:

Move marked block: `^KO^KV^QV^B
^QO^KO^KH^B`

(continued)

```
<alt><^rgt><ctrlq>f<vfid>...<vfid><center><center><alt>->
*
<alt><bksp><lft><ctrlq><alt>->
*
<alt><ctrlbks><ctrlq>a<ctrln><center> <center>n<center><alt>->
*
<alt><del><ctrlq><alt>->
*
<alt><bktab><ctrlp>h<alt>->
*
<alt><ctrl\><ctrlk>b<rgt><ctrlk>k<lft><lft><ctrlk>v<alt>->
*
<alt><ctrl12><ctrlq>c<center><ctrlk>v<ctrlb><ctrlq>v<ctrlk>h<ctrlb><alt>->
*
<alt><ctrl16><vfid>...<vfid><alt>->
*
<alt><pgup><ctrlq>a<vfid>...<vfid><center><vfid>...<vfid><center>gn
<enter><rgt><alt>->
*
<alt><pgdn><ctrlq>a<vfid> <vfid><center><center>gn<center><rgt><alt>->
*
<alt><^home><ctrlq>f<ctrln><ctrln><center>b<center><dn><dn><alt>->
*
<alt><^end><ctrlq>f<ctrln><ctrln><center><center><lft><lft><alt>->
*
```

Figure 4: This file, *WSKY.PRO*, contains the ProKey definitions of WordStar command strings. The less than (<) and greater than (>) signs bracket two-key combinations and should not be typed in; for instance, `<altf>` signifies the Alt-F combination.

```
<alt><f1>PROKEY DEFINITIONS OF DOS KEYS (DOSKY PRO) Oct 13, 1983<alt>->
<alt><f1>dir <alt>->*<alt><f2>type <alt>->
*
<alt><f3>rename <alt>->*<alt><f4>copy <alt>->
*
<alt><f5>erase <alt>->*<alt><f6>chkdsk <alt>->
*
<alt><f7>basica <alt>->*<alt><f8>prokey <alt>->
*
<alt><f9>A <alt>->*<alt><f10>B.<alt>->
*
<alt><altf1>cls <center><alt>->*<alt><altf2>comp <alt>->
*
<alt><altf3>graphics <alt>->*<alt><altf4>print <alt>->
*
<alt><altf5>more <alt>->*<alt><altf6>sort <alt>->
*
<alt><altf7>format <alt>->*<alt><altf8>autoexec <center><alt>->
*
<alt><altf9><ffld> <ffld>-<ffld>...<ffld>-<ffld> <ffld><center><alt>->
*
<alt><altf10><ffld> <ffld> <ffld>...<ffld> <ffld>...<ffld><alt>->
*
<alt><capsf9>date<alt>->*<alt><capsf10>time<alt>->
*
```

Figure 5: The ProKey definitions of the DOS keys are in this *DOSKY.PRO* file.

Copy marked block: ^K^KC^B^QV
^B^Q^K^KH
Delete marked block: ^Q^KY^B

Column Mode

When you move text in regular block mode, the encoded carriage returns move also. In column mode, the carriage returns stay in the original location, leaving an empty gap marked with hard returns (<). You can delete one line at a time with ^Y or return to regular block mode and use ^KY.

When in column mode, you will not be able to edit the column without disturbing text already positioned to the right on the same line. Move the block to the end of the file or even to a separate file, edit it, and then move it back.

When you remove a column block, text to the right of the removed block will shift left.

When using print control commands in column mode, put the control at the beginning and end of each part so that no matter where the column appears, it will not affect the text in adjacent columns.

When forming text into separate columns on the same page, remember that only those soft hyphens at the end of a line will print. Soft hyphens at the left of a column must be changed to hard hyphens. If you are printing with a microjustifying printer, be sure to use .UJ OFF to turn off microjustification. Also turn off the bidirectional printing with .BP OFF.

Search and Replace

QV will return you to the cursor's position before a word search so you won't lose your place. ^QV can be entered at any time, even after several editing commands.

Several special codes can be entered within the word you are searching for with ^QA or ^QF. The options are entered with the ^P prefix first (it does not appear on the screen). ^A will match any character, ^N will find carriage returns (hard or soft), and ^S will match any character that is not a letter or digit. To exclude a character from the match, type ^O followed by the character. Thus, to find the next blank line, enter ^QF^PN^PN <ESC>.

When editing a long document, use

When in column mode, you will not be able to edit the column without disturbing text already positioned on the same line.

^KS before entering ^QA and G (global option). This may eliminate a disk full warning, and all recent editing changes will be saved. To replace without asking, use the N (no delays) option. Use N with G to replace within the entire file from beginning to end. To accelerate this command by preventing the screen from displaying each substitution as it is made, press any cursor movement key while the command is executing. Use N with B to replace within the file from the cursor to the beginning. Use N with any large number to replace from the cursor to the end of the file.

To erase a word or phrase, use ^QA and press <R> for the replacement word. The word will be found, removed, and replaced with nothing. ^L can be

used to repeat the command.

To insert a word or phrase while you are typing, enter ^QA (but don't enter a search word) and press <R>. Then enter the replacement word, and type N so replacements will be done without *WordStar* asking if you want to replace. *WordStar* will automatically type out the phrase at the current location of the cursor. Then continue to type your document. Whenever you want to insert the same phrase, just type ^L. Your text will be entered as if you had just typed it.

Formatting

If you move from single-spacing to double-spacing, ^B will not add a line between paragraphs. Use ^N to enter one line between paragraphs. ^N always creates single-spacing while <R> follows whatever line spacing is in use. ^N always leaves the cursor before the inserted return, while <R> leaves the cursor after the carriage return.

To create a border around a table or form, let the ^QA option work for you. You will replace each line return with the special symbol for your border, both at the beginning and end of each line. If the special symbol is | and the border should be 10 lines in length, enter the command like this: ^QA^P^N<R>|^P^N|^<R>11N<R>. The number 11 is one more than the border should be in length. The extra symbols at the beginning and end of the border can be removed, a top and bottom line put in, and the border will be complete.

Create a form document that contains all dot commands and ruler lines for a special document. Then, open a new file, use ^KR to read in the special form, and start typing the text. You do not have to remember what is needed each time. Whenever you need special margins and

tabs, just position the cursor on the proper ruler line and type ^OF.

If you do not have *MailMerge*, you can still create boilerplate text for insertion into different documents. Make separate files for each boilerplate insertion and read the necessary ones into the current document.

Margins

The center of a line depends on its margins. If you change the line width, recenter titles with ^OC again.

Text is written in columns 1 to 65 by default. If you are going to use condensed, double-width, or double-width condensed text, and you want to have the same margins, use the following commands:

```
Condensed: ^OL7<R>^OR118<R>
           ^OI15<R>^ON11<R>
           ^ON6<R>^ON4<R>^ON8<R>
Double:    ^OL1<R>^OR33<R>^OI4<R>
           ^ON6<R>^OI11<R>
           ^ON15<R>^ON4<R>
Cndns,dbl: ^OL4<R>^OR59<R>^OI8<R>
           ^OI11<R>^ON6<R>
           ^ON15<R>^ON<R>
Normal:    ^OL1<R>^OR65<R>^OI6<R>
           ^OI11<R>^ON15<R>
           ^ON4<R>^ON8<R>
```

Overprint Command

If your printer is not capable of continuous underlining and you want to underline the spaces between words, create the line of characters you want printed, type ^PM for the overprint line command, and then position a line of underscores where you want it:

This is my text ^PM

and on the next line type

The printer will overprint the under-

scores on top of the line already printed, resulting in spaces in the text being underlined. This eliminates a lot of messy ^PS commands throughout the text.

If you want to strike out text by using some character like x or / or \ instead of the hyphen *WordStar* uses, follow the above method for overprinting a line.

The overprint character command can also be used to create additional characters not available from the keyboard. For example, to create the symbol for cents, use c^PH/.

To stop the printer at a specific place in order to change the ribbon or daisy wheel, use ^PC. However, a dot-matrix printer may not stop at the desired position, but it may stop before any information is printed for the entire line.

Dot Commands

Be careful not to set .CP in a line of text since it will prevent the text from printing. Also, if you place it in a blank line above the text to be protected, be sure to compensate for the line that does not print. To center a heading, type the text, use ^OC to center it, then insert .HE and a space beginning in column 1. Use ^QD to move to the end of the line, then press <R>.

WordStar's default is set so the current page number is printed at the center bottom of each page. To change the position of the default page number, use .PC n, where n represents the page number. To prevent the page number from printing at the bottom of the page, use an .FO command with no provision for a number, use the .OP command (which applies only to the default page number at the center bottom), or use .BM OFF. The dot commands .HE and .FO have no page-numbering capability without a #

in the same line. To continue page numbering after removing a text heading or footing, be sure to put a # in the new .HE/.FO line.

The command .HE#<R>.PN87<R>.OP<R> causes the heading to be numbered starting with page 87, and it suppresses the footing page number.

Disk File Output

Since dot commands do not print, checking them can be inconvenient. Answering Y to the option SUPPRESS PAGE FORMATTING asked by the print P command will cause them to be printed. In addition, there will be no margins, offsets, headings, footings, page numbers, or separation between pages. This option prints the exact contents of a file rather than its final form. It sends a disk image to print.

The option SUPPRESS PAGE FORMATTING can be used to print files that have been printed to disk, as well as already formed files created by other programs.

WordStar to Printer Conversions

To calculate the proper numbers for dot commands, you have to convert the measurements of your forms in inches into the units of measure that *WordStar* understands—that is, lines and columns. To leave space for illustrations or tables, adjust the margins accordingly. Since on a normal page 10 characters equal 1 horizontal inch and 6 lines equal 1 vertical inch, you can convert the size of the hole needed from inches into columns and lines. Add a few additional columns and lines to allow for a margin, change the left or right margin accordingly, and then type the new text or reform the paragraph.—J.E.

Einstein had every gift a great thinker needs. Except one.

The FinalWord.

With it, he would've been able to make sure every one of his great ideas ended up where it belonged. On paper.

Because The FinalWord offers great thinkers an arsenal of word processing commands so powerful, they're free at last to concentrate solely on having great ideas. While the FinalWord concentrates on making them look good on paper. You never format. You only think.

In fact, one reviewer called The FinalWord "the thinking person's word processor." Einstein would've liked that.

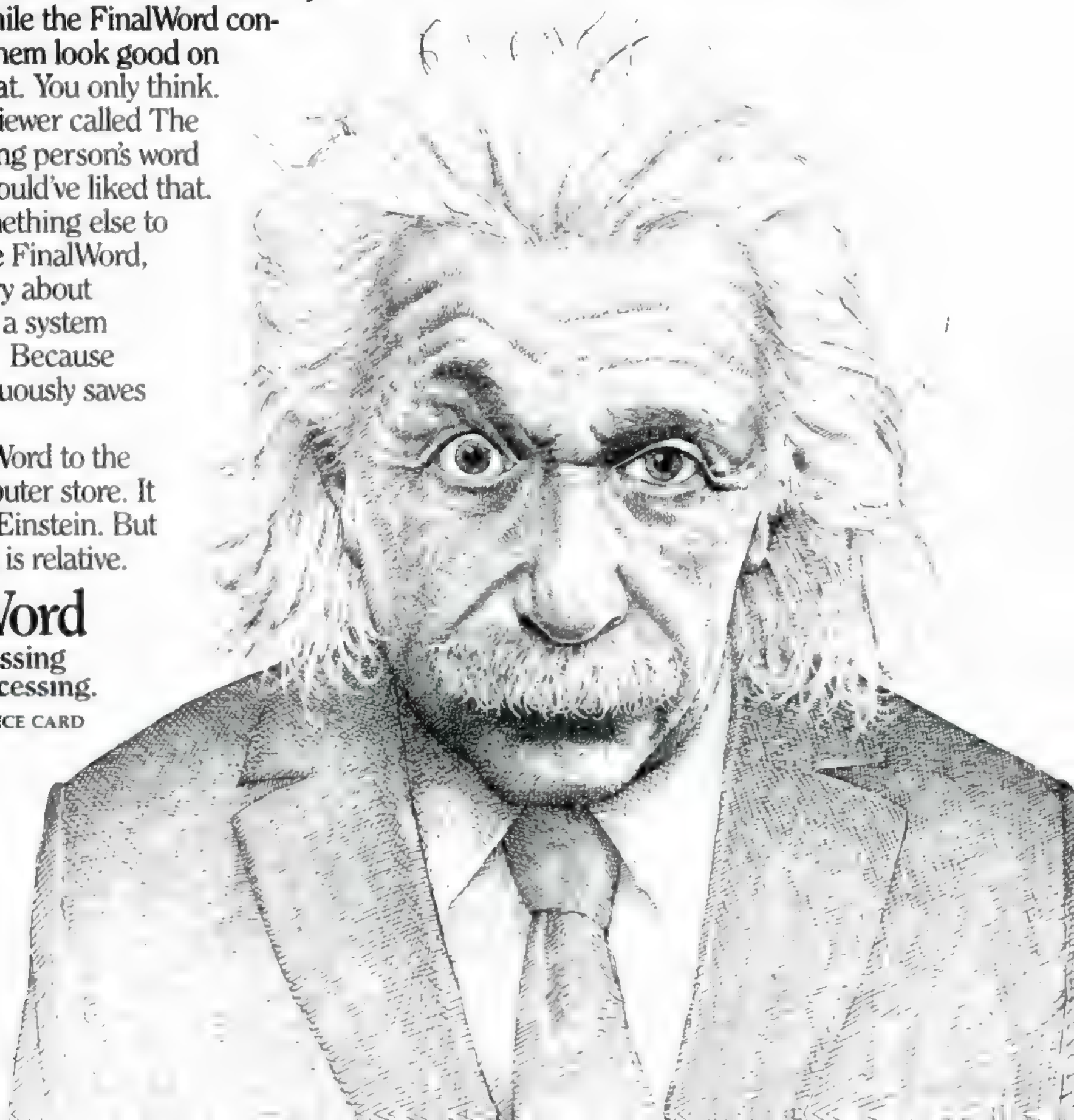
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NEW FONT

Creating Fonts Without Fuss

NEWFONT is a BASIC program that lets you do what the IBM color/graphics adapter can't do by itself—create small, compact fonts for graphics and lettering.

Illustration Doug Taylor





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The PC or XT, equipped with IBM's standard color/graphics adapter, is a powerful graphics tool. It easily produces detailed drawings, charts, plots, and diagrams for business and many other uses. For some applications, however, it suffers a serious shortcoming: it does not vary the size of its lettering.

The machine's standard character set, using the color/graphics board, is a 7×7 pixel double-dot font, which is displayed in either a 40-column or an 80-column format, depending on the screen's mode and width settings (see Figure 1). In text mode, the font includes IBM's standard 256 characters, produced from dot patterns contained in a character-generator ROM chip. In graphics mode, the font includes the lower half of the standard character set and is produced from 1024 bit-mapped bytes contained in the ROM BIOS.

If you want to change character sets while in text mode, you have few alternatives. You can get a "skinnier" single-dot 6×7 pixel font by putting a jumper wire into the box marked P3 on the color/graphics board. These skinnier characters are a useful variation for users with high-resolution monitors, although in the 80-column format a difference is noticeable in the weight of the characters' horizontal and vertical strokes, which some people may find unattractive. Another alternative, if you wish to change hardware, is to replace the character generator ROM with a compatible PROM containing a custom character set.

In graphics mode, you have more alternatives. You can write software to produce a multitude of character sets, large or small. You can produce large fonts, such as those suitable for titles, by some form of vector drawing in which instructions for each stroke of each character are stored in a file or in data statements. Small fonts, 8×8 pixels or less, are usually formed from bit-mapped bytes similar to those used by IBM's graphic character set. Both techniques tend to be

fairly tedious since they require individual coding of each element of each character. The obvious solution is a software tool that will do this coding quickly and automatically, using interactive "drawing" from the keyboard.

I have written such a tool, a BASIC program called NEWFONT that allows the user to form new characters by filling in boxes in a grid displayed on the screen. NEWFONT will generate the bit-mapped bytes for the characters, store these in a file of up to 128 characters, and save the



You can write
software to produce
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file in binary format for subsequent use by any graphics program that needs a small custom font.

Why Small Fonts?

The PC's standard 7×7 pixel graphics font shows up as bold characters, designed to be readable on a wide range of monitors. In high-resolution mode, the characters print in 80-column format, which is compact enough for most lettering needs including for labeling. In high-resolution mode, however, color capability is limited to black and white on composite monitors and to black plus one color on RGB monitors. For users who want to

do multicolor graphics, high-resolution mode is not the answer.

In their medium-resolution mode, up to 16 colors (four at a time) can be displayed on most high-quality monitors. However, in this mode the standard font prints in a 40-column format, producing "fat" characters. These characters are suitable for use in headlines and titles but they are too big for writing large blocks of text and they are usually inconvenient for detailed work such as labeling charts and diagrams. For these tasks and others requiring more delicate characters, smaller, more compact fonts are much more useful.

There is a reason, of course, why the PC does not offer more compact fonts. IBM designed its color/graphics card to support many kinds of color monitors, including TV receivers, composite monitors, and RGB monitors. Monitors driven with a composite video signal (this category includes TV sets and composite monitors) get their color from a subcarrier contained in this signal.

In the PC, this subcarrier generates 160 color "clocks," or possible color changes, per line. This number is one-half the pixel resolution of the computer's screen when in medium-resolution mode. Monitors using this technology cannot make valid color changes in a horizontal line more frequently than every second pixel. To work within this restriction, IBM uses the double-dot characters, and with this construction, it is hard for users to form characters much smaller than 7×7 pixels.

Monitors driven with direct red, green, and blue color signals (RGB monitors) do not depend on a color subcarrier and are not limited to 160 color "clocks" per line. They can change color at every pixel. Users with high-resolution RGB monitors consequently have many additional character display alternatives open to them. Some examples are shown in Figure 2. With font sizes from 3×5 pixels to 8×8 pixels and free choice of palette colors, text to complement almost any graphic display is possible.

Generating New Fonts

Characters displayed on the screen using the bit-mapped technique are contained within a cell of pixels, as shown in Figures 1 and 2. Pixels that form the character itself can be thought of as foreground; the balance of the cell is background. Cells in the IBM graphics font are 8×8 pixels. This is a convenient arrangement because each row of the cell can be represented by 1 byte of data, with each bit corresponding to a pixel. Eight bytes, each representing a row in the cell, can store the bit data for the entire cell. If the bits are arranged in such a way that "on" bits form the foreground of a character, the bytes can be read by a suitable program to display the desired character on the screen. This is the technique the PC uses in its graphics mode. For each character that is printed, a group of 8 bytes is read from the byte table in the ROM BIOS, interpreted by a print routine, and displayed.

To generate new fonts, you need only assemble groups of 8 bytes containing the desired bit patterns and store these so that they can be easily accessed by appropriate display programs.

Figure 3 is a listing of NEWFONT, a program you can run under the Advanced BASIC interpreter or in compiled form to do most of the labor of creating new fonts. When you run NEWFONT you will find the screen divided into two parts: grid A and grid B. Both grids contain 8×8 pixel boxes that correspond to the pixels in the cell to be occupied by the characters you create. To form a character, fill in the appropriate boxes. You do this by using the cursor keys to move a dot to the box you want to fill or erase. Then press the Ins key to fill the box or press the Del key to erase the box.

When the character is formed, save it by pressing F6 and entering a character code (usually the ASCII code). The character will be stored in a 1K section of memory reserved for the grid you are working on, at an offset corresponding to the character code you have selected. The

1K memory section will store 128 characters numbered from 0 to 127 (or 128 to 255). To recall a character, press F2 and enter its code. To change the active grid, press F9 or F10. To clear a grid, press the space bar.

When you have completed a character set you can move it from the reserved memory area to disk by pressing Ctrl F5 and entering a filename. The character set will be saved in binary format and can later be loaded into any graphics program that needs your new font.



With double-dot characters it is hard to form characters smaller than 7×7 pixels.

To recall a font from disk, press Ctrl F1 and enter its filename. The font will be loaded into reserved memory space corresponding to the active grid. Individual characters can then be displayed with the F2 key. Any modification made to the character while displayed can be saved to memory and to disk by pressing the F6 key and the Ctrl F5 key combination described above.

Before starting a new font, it is advisable to clear any garbage from the reserved memory area where the font will be stored. To do this, you simply press Ctrl-F1 and in response to the "file ?" prompt, enter NEW.

Two at a Time

Since NEWFONT displays two grids, you can work on two fonts at the same time. This feature is handy, for example, if you want to create two character sets with similar styles, but different sizes. You can also use one grid as a reference while developing new characters in the second grid. One valuable reference is the standard character set in the ROM BIOS. You can call up characters from this font at any time by entering F4 and the character's ASCII code. You can also move a character from one grid to the others by pressing F1 and enter "A" or "B" as appropriate.

As you fill in boxes in a grid, an actual-size display of the pixels forming your new character appears above the grid, so you can see what the character will look like when printed normally. For reference purposes, the hexadecimal equivalent of the bits in each row appears to the side. To end the program, press the Esc key.

New character sets created by NEWFONT are stored on disk in 1K binary files. NEWFONT saves these files with the BASIC command BSAVE and they can be reloaded with the BLOAD command. To use the new fonts, simply have your BASIC program use the BLOAD command to put the font into a reserved area of memory and include in your program the coding needed to access and display the font.

You can reserve memory for fonts either inside or outside of BASIC's 64K data segment (work area). Where you put them depends on the total amount of available memory in your system and on the size of your program. If you load the fonts inside BASIC's work area, you need to protect the memory space to keep BASIC from writing over the fonts. The most straightforward way of doing this is to use either the CLEAR command in your program or the /M: option when starting BASIC. If you load outside the BASIC work area, you need at least 96K bytes in your system so that you can load the fonts into a safe area above DOS, the BASIC

extension, and the 64K work area. Appendix C of IBM's BASIC manual explains these alternatives in detail. Figures 4 and 5 give examples of code for loading fonts both ways.

To display your custom fonts, you can use either the machine's own print routines, which are contained in the ROM BIOS and accessed with the normal PRINT command, or you can create special routines to "draw" the characters.

The advantage of using the ROM BIOS routines is that your program code is simplified and printing is fairly fast—at BASIC's usual speed. The disadvantage is that you are restricted to the machine's normal text display formats, which means that text cannot be compressed. Characters can be located only at the standard row and column positions, and each character

will be printed in a full 8×8 pixel cell. In medium-resolution mode you still get 40-column format, no matter how small your font. Small characters simply print with large spaces between them.

Subroutines to "draw" your fonts can be coded to display characters virtually any way you wish: horizontally, vertically, diagonally, or even backward and upside down. You can locate text anywhere on the screen, and intercharacter spacing can be set to any desired pixel width. Proportional spacing becomes possible and often the "footprint" of the font can be reduced, since you do not have to draw cells larger than the dimensions of the largest character in a font. This can be important for labeling in confined areas where you must avoid overwriting adjacent material. The disadvantages of

"drawing" fonts are that coding is more complex and printing is noticeably slower, especially when using interpreted languages.

The ROM BIOS Print Routines

Figure 4 lists BIOPRINT.BAS, a miniprogram that illustrates typical BASIC code for displaying new fonts using the ROM BIOS print routines. The technique is to install the new font as the upper half of the BIOS graphic character set, then call characters to be printed by adding 128 to the ASCII value of each character in a print statement.

Line 150 of the program reserves 2K of memory at the top of BASIC's work area for two fonts, which are then BLOADED in lines 160 and 170. The fonts are assigned symbolic names, the variables F4×6 and F5×7, to make it convenient to refer to them later in the program. The variables are given values equal to the offsets into BASIC's data segment where the fonts are loaded.

When the ROM BIOS is asked to print a character that has an ASCII value above 127, it looks at interrupt vector 1F, located at absolute address 007C to 007F hexadecimal, for the address of the byte table it will use to generate the character. We must therefore set this interrupt vector to point to the font we wish to print. We do this by loading into the bytes at 007E and 007F the address of BASIC's data segment (lines 190 and 200) and by setting the bytes at 007C and 007D equal to the offset of the selected font (lines 390 to 410). (Readers wanting more background on this technique should see "Exercising ASCII," *PC Magazine*, Volume 1 Number 12.)

Lines 270 to 300 of Figure 4 illustrate the code that must be included for each print operation. Font and palette color are selected in line 270. The starting point for printing is set with the LOCATE statement in line 280. Real and integer variables are converted to strings, concatenated with other string values, and assigned to \$\$ (the input parameter to a

IBM Color Graphics Fonts

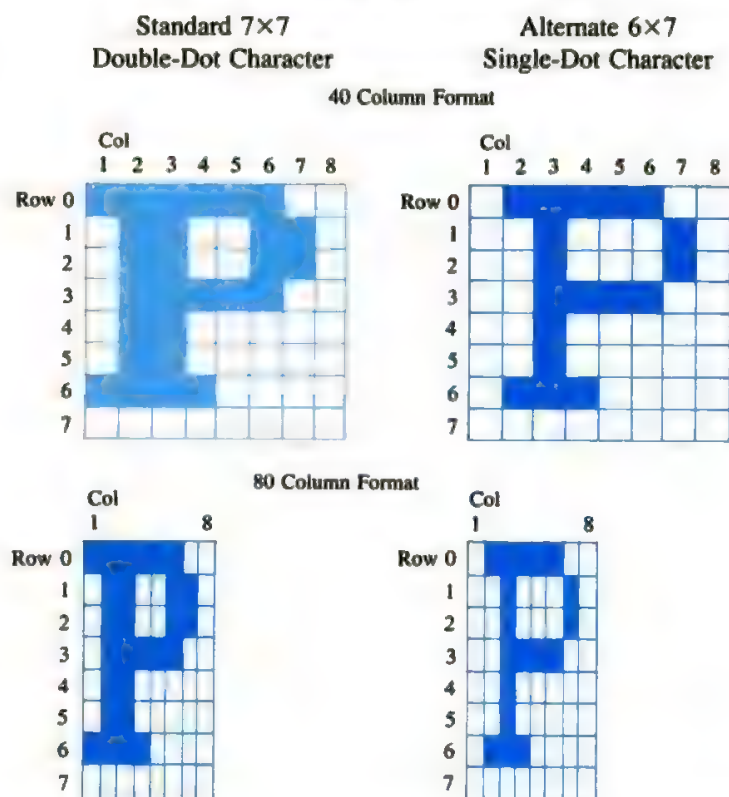


Figure 1: The standard 6×7 and 7×7 characters generated by the PC, in 40-column and 80-column variations.

New Fonts You Can Create

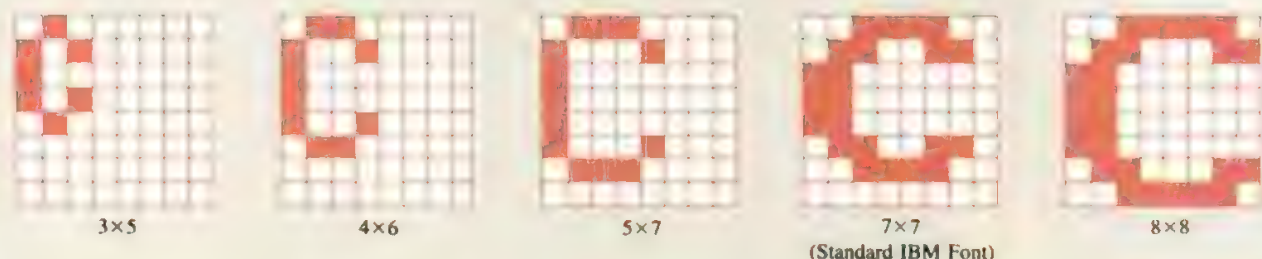


Figure 2: Examples of new fonts you can create with the NEWFONT program and a high-resolution RGB monitor.

print subroutine) to which we GOSUB in line 300.

The print subroutine does the following: Lines 390 to 410 complete the setting of the graphics character set pointer as described above. The code in lines 400 and 410 converts the offset value in FONT to hexadecimal characters so that the two bytes in this integer can be separated easily and put into locations 007C and 007D using the POKE command. Note that this coding is valid as long as the value in FONT translates to four hexadecimal characters (this will be true for fonts loaded at 4K or above in any segment).

Line 420 sets a byte located at offset 004E in BASIC's data segment to the color value selected in line 270. Values can be 1, 2, or 3, corresponding to the valid palette colors (this method works with the BASIC interpreter, but not with compiled programs).

The loop in lines 440 to 460 cycles through the characters in string S\$, getting the ASCII value of each. The program then adds 128 to these values, causing the ROM BIOS routine to print characters that are generated from the upper-half byte table.

Routines to 'Draw' Characters

The PROPRINT.BAS program listed in Figure 5 illustrates the technique of displaying text by "drawing" the characters. It includes the coding for proportional spacing.

In lines 150 to 170 of this figure, two

fonts are loaded, this time into memory space outside of BASIC's work area, at hexadecimal addresses 17800 (94K) and 17C00 (95K). The fonts are given symbolic names as before, with values set equal to the offsets into the segment beginning at address 94K.

Lines 270 to 300 are the coding for each print operation; they are the same as in the previous program except that now we set the starting point for printing with the PRESET statement instead of a

To generate new
fonts, you need only
assemble groups of
8 bytes containing
the desired bit
patterns.

LOCATE statement. With PRESET, we can, of course, start at virtually any pixel on the screen.

In the print subroutine we again set up a loop to cycle through the string S\$, getting the ASCII value of each character (lines 390 and 400). Then, in sequence, we retrieve the bytes corresponding to each row of the character from the selected font (line 420). (During this instruction, DEF SEG must be set to the same value as in line 150). Each byte is examined to determine which bits are "on," by using the

AND command with a mask in which one "on" bit progresses from column 1 to column 8 (lines 440, 450, 480, 490). Bits which are "on" cause the PRESET statement in line 470 to paint pixels in the foreground color; "off" bits are painted in the background color. The action of the nested ROW and COL loops causes the complete character cell to be displayed.

Line 500 measures the bit-width of each character for proportional spacing. The Boolean logic operation AND is performed on BITS and each row byte of the character; by the end of the ROW loop, the position of the rightmost "on" bit in BITS signifies the width of the character. The PITCH loop in lines 540 to 570 locates this "on" bit by shifting the bits in BITS to the right (dividing by 2) until BITS is odd, signifying an "on" bit in the zero position. The PITCH loop then contains the width of the character.

To the PITCH loop must be added the desired intercharacter spacing. In Figure 5, a spacing of 1 pixel is added in line 590. This spacing can be varied to suit the size of the font. We must also handle special cases such as the space character (ASCII 32) as shown in line 600 and perhaps other characters such as punctuation marks (not shown). Finally, in line 610, we use the PRESET command to get to the next character, advancing by a displacement equal to PITCH.

One of the interesting advantages of the "drawing" technique is that characters can be displayed in many ways. The cod-

NEW FONTS

```

100 ' program NEWFONT.BAS to create new character sets for the IBM-PC
105 ' Hugh S. Jackson, 1984. All commercial rights reserved by author.
110 '
115 KEY OFF: SCREEN 1: COLOR 9,0: CLS: CLEAR,&HF800
120 DEFINT A-Z: ON ERROR GOTO 1115: FOR R=1 TO 10: KEY R,"": NEXT
125 DIM H(7,1), V(4,1), BIN(7,1), FONT(1), FL(1), CH$(1), FILE$(1)
130 DIM GRIDA(188),GRIDB(188): GOSUB 1145 ' initialize arrays
135 '
140 ' set up screen
145 '
150 PRINT " <" CHR$(27) CHR$(24) CHR$(25) CHR$(26);
155 PRINT "> <Ins> <Del> <Space> <Esc>";
160 LINE (0,10)-(319,170),1,B: LINE (1,11)-(318,169),2,B
165 LINE (2,11)-(2,169),2: LINE (317,11)-(317,169),2
170 LINE (3,12)-(316,168),1,B
175 '
180 FOR A=31 TO 95 STEP 8
185 LINE (84,A)-(148,A),1: LINE (A+53,32)-(A+53,94),1
190 LINE (172,A)-(236,A),1: LINE (A+141,32)-(A+141,94),1
195 NEXT: GOSUB 970: G=1: GOSUB 970
200 '
205 LOCATE 14,10: PRINT "f9" SPC(18) "f10";
210 LOCATE 16,8: PRINT "GRID A" SPC(14) "GRID B";
215 GET (16,118)-(148,128),GRIDA
220 GET (172,118)-(304,128),GRIDB
225 '
230 LOCATE 23,1: PRINT " ^f1      f2      f4      ^f5      f6";
235 LOCATE 24,1: PRINT "  load    load    bios    save    save";
240 LOCATE 25,1: PRINT "  file    char    char    file    char";
245 GOTO 800
250 '
255 ' main input
260 '
265 DEF SEG=0: POKE &H417,&H40: DEF SEG 'set num lock to cursor mode
270 I$=INKEY$: IF I$="" THEN 270
275 IF I$=CHR$(0)+CHR$(72) THEN IF V(1,G)=V(0,G) THEN 265 ELSE V(1,G)=V(1,G)-8:
GOTO 370 ' up
280 IF I$=CHR$(0)+CHR$(75) THEN IF H(1,G)=H(0,G) THEN 265 ELSE H(1,G)=H(1,G)-8:
GOTO 370 ' left
285 IF I$=CHR$(0)+CHR$(77) THEN IF H(1,G)=H(3,G) THEN 265 ELSE H(1,G)=H(1,G)+8:
GOTO 370 ' right
290 IF I$=CHR$(0)+CHR$(80) THEN IF V(1,G)=V(3,G) THEN 265 ELSE V(1,G)=V(1,G)+8:
GOTO 370 ' down
295 IF I$=CHR$(0)+CHR$(82) THEN 400 'insert
300 IF I$=CHR$(0)+CHR$(83) THEN 440 'delete
305 IF I$=CHR$(0)+CHR$(60) THEN 505 'load char
310 IF I$=CHR$(0)+CHR$(62) THEN 600 'load char from bios
315 IF I$=CHR$(0)+CHR$(64) THEN 750 'save char
320 IF I$=CHR$(0)+CHR$(67) THEN 800 'grid A
325 IF I$=CHR$(0)+CHR$(68) THEN 835 'grid B
330 IF I$=CHR$(0)+CHR$(94) THEN 870 'load file
335 IF I$=CHR$(0)+CHR$(98) THEN 930 'save file
340 IF I$=CHR$(32) THEN GOSUB 970: GOTO 265 'clear grid
345 IF I$=CHR$(27) THEN SCREEN 0,0: WIDTH 80: END 'escape
350 GOTO 265
355 '
360 ' move dot
365 '
370 IF POINT(H(2,G)+1,V(2,G))=2 THEN PSET(H(2,G),V(2,G)),2 ELSE
PSET(H(2,G),V(2,G)),3
375 IF POINT(H(1,G)+1,V(1,G))=2 THEN PSET(H(1,G),V(1,G)),3 ELSE
PSET(H(1,G),V(1,G)),2

```

Figure 3: A listing of NEWFONT, a program you can use to create a variety of fonts beyond the PC's normal capabilities.


```

380 H(2,G)=H(1,G): V(2,G)=V(1,G): GOTO 265
385 '
390 ' insert
395 '
400 IF POINT(H(1,G)+1,V(1,G))=3 THEN BEEP: GOTO 265 ELSE
    PAINT(H(1,G),V(1,G)),3,1: PSET(H(1,G),V(1,G)),2
405 COL=(H(1,G)-H(0,G))/8: ROW=(V(1,G)-V(0,G))/8
410 PSET(H(4,G)+COL,V(4,G)+ROW),3
415 BIN(ROW,G)=BIN(ROW,G) OR &H80/2*COL
420 GOSUB 480: GOTO 265
425 '
430 ' delete
435 '
440 IF POINT(H(1,G)+1,V(1,G))=2 THEN BEEP: GOTO 265 ELSE
    PAINT(H(1,G),V(1,G)),2,1: PSET(H(1,G),V(1,G)),3
445 COL=(H(1,G)-H(0,G))/8: ROW=(V(1,G)-V(0,G))/8
450 PSET(H(4,G)+COL,V(4,G)+ROW),0
455 BIN(ROW,G)=BIN(ROW,G) XOR &H80/2*COL
460 GOSUB 480: GOTO 265
465 '
470 ' print hex value
475 '
480 HX$=HEX$(BIN(ROW,G)): IF LEN(HX$)=1 THEN HX$="0"+HX$
485 LOCATE ROW+5,H(7,G): PRINT HX$: RETURN
490 '
495 ' load char from memory
500 '
505 LOCATE 20: GOSUB 1030
510 LOCATE,H(6,G): PRINT "char code: ": MAXCHAR=3: GOSUB 1050: CH$(G)=S$
515 IF CH$(G)=" " THEN 580
520 IF CH$(G)="A" OR CH$(G)="a" THEN IF G=0 THEN 580 ELSE 680
525 IF CH$(G)="B" OR CH$(G)="b" THEN IF G=1 THEN 580 ELSE 680
530 CH=VAL(CH$(G)): IF CH<0 OR CH>255 THEN 580
535 CH=CH MOD 128: FL(G)=0: GOSUB 970
540 FOR ROW=0 TO 7
545   BIN(ROW,G)=PEEK(FONT(G)+CH*8+ROW): M=&H80: MH=H(0,G)
550   FOR COL=0 TO 7
555     IF NOT BIN(ROW,G) AND M THEN 565
560     PAINT(MH,V(0,G)+8*ROW),3,1: PSET(H(4,G)+COL,V(4,G)+ROW),3
565     M=M/2: MH=MH+8
570   NEXT COL: GOSUB 480
575 NEXT ROW: GOTO 265
580 BEEP: CH$(G)=" ": GOSUB 1030: GOTO 265
585 '
590 ' load char from bios
595 '
600 LOCATE 20: GOSUB 1030
605 LOCATE,H(6,G): PRINT "char code: ": MAXCHAR=3: GOSUB 1050: CH$(G)=S$
610 IF CH$(G)=" " THEN 580
615 CH=VAL(CH$(G)): IF CH<0 OR CH>255 THEN 580
620 CH=CH MOD 128: FL(G)=0: GOSUB 970: DEF SEG=&HF000
625 FOR ROW=0 TO 7
630   BIN(ROW,G)=PEEK(&HFA6E+CH*8+ROW): M=&H80: MH=H(0,G)
635   FOR COL=0 TO 7
640     IF NOT BIN(ROW,G) AND M THEN 650
645     PAINT(MH,V(0,G)+8*ROW),3,1: PSET(H(4,G)+COL,V(4,G)+ROW),3
650     M=M/2: MH=MH+8
655   NEXT COL: GOSUB 480
660 NEXT ROW: GOTO 265
665 '

```

(continued)


```

670 ' load char from opposite grid
675 '
680 NG=G XOR 1: CH$(G)=CH$(NG): GOSUB 1030
685 IF CH$(G)<>" " THEN LOCATE,H(6,G): PRINT "char code: " CH$(G)
690 FL(G)=0: GOSUB 970
695 FOR ROW=0 TO 7
700   BIN(ROW,G)=BIN(ROW,NG): M=&H80: MH=H(0,G)
705   FOR COL=0 TO 7
710     IF NOT BIN(ROW,G) AND M THEN 720
715     PAINT(MH,V(0,G)+8*ROW),3,1: PSET(H(4,G)+COL,V(4,G)+ROW),3
720     M=M/2: MH=MH+8
725   NEXT COL: GOSUB 480
730 NEXT ROW: GOTO 265
735 '
740 ' save char to memory
745 '
750 LOCATE 20: GOSUB 1030: IF CH$(G)<>" " THEN 765
755 LOCATE,H(6,G): PRINT "char code: ";: MAXCHAR=3: GOSUB 1050: CH$(G)=S$
760 IF CH$(G)=" " THEN 580
765 CH=VAL(CH$(G)): IF CH<0 OR CH>255 THEN 580
770 CH=CH MOD 128: FL(G)=1: GOSUB 1030
775 FOR ROW=0 TO 7: POKE FONT(G)+CH*8+ROW,BIN(ROW,G): NEXT
780 LOCATE,H(6,G): PRINT "char " CH$(G) " saved";: CH$(G)=" ": GOTO 265
785 '
790 ' switch to grid A
795 '
800 PUT (172,118),GRIDB,PSET
805 LINE (172,123)-(210,123): LINE (267,123)-(304,123)
810 PUT (16,118),GRIDA,PSET
815 G=0: GOTO 265
820 '
825 ' switch to grid B
830 '
835 PUT (16,118),GRIDA,PSET
840 LINE (16,123)-(50,123): LINE (107,123)-(148,123)
845 PUT (172,118),GRIDB,PSET
850 G=1: GOTO 265
855 '
860 ' load file
865 '
870 LOCATE 18: GOSUB 1030
875 LOCATE,H(5,G): PRINT "file? ";: MAXCHAR=12: GOSUB 1050: FILE$(G)=S$
880 GOSUB 1030: IF FILE$(G)=" " THEN BEEP: GOTO 265
885 FL(G)=1: IF FILE$(G)="NEW" OR FILE$(G)="new" THEN 900
890 BLOAD FILE$(G),FONT(G)
895 LOCATE,H(6,G): PRINT FILE$(G);: GOTO 265
900 LOCATE,H(6,G): PRINT "working...";
905 FOR BYTE=0 TO &H3FF: POKE FONT(G)+BYTE,0: NEXT
910 LOCATE,H(6,G): PRINT "memory cleared";: FILE$(G)=" ": GOTO 265
915 '
920 ' save file
925 '
930 LOCATE 18: GOSUB 1030: IF FILE$(G)<>" " THEN 945

```



```

935 LOCATE,H(5,G): PRINT "file? ": MAXCHAR=12: GOSUB 1050: FILE$(G)=S$
940 GOSUB 1030: IF FILE$(G)="" THEN BEEP: GOTO 265
945 BSAVE FILE$(G),FONT(G),%H400
950 LOCATE,H(5,G): PRINT FILE$(G) " saved": FILE$(G)="": FL(G)=1: GOTO 265
955 '
960 ' paint grid
965 '
970 LOCATE 3: GOSUB 1030
975 ROW=5: FOR R=35 TO 91 STEP 8
980   FOR C=H(0,G) TO H(3,G) STEP 8: PAINT(C,R),2,1: NEXT C
985   LOCATE ROW,H(7,G)-2: PRINT "&h00";
990 ROW=ROW+1: NEXT R
995 IF FL(G)=1 THEN LOCATE 20: GOSUB 1030: FL(G)=0
1000 FOR ROW=0 TO 7: BIN(ROW,G)=0: NEXT
1005 H(1,G)=H(0,G): V(1,G)=V(0,G): PSET (H(1,G),V(1,G))
1010 H(2,G)=H(1,G): V(2,G)=V(1,G): RETURN
1015 '
1020 ' blanker
1025 '
1030 LOCATE,H(5,G): PRINT SPC(18): RETURN
1035 '
1040 ' keyboard input
1045 '
1050 S$="": KCHAR=0: START=POS(0)
1055 CHAR#=INKEY$: IF CHAR#="" THEN 1055
1060 IF CHAR#=CHR$(13) THEN RETURN
1065 IF CHAR#=CHR$(8) THEN GOSUB 1085: GOTO 1055
1070 IF LEN(CHAR#)>1 OR CHAR#<CHR$(32) THEN 1055
1075 KCHAR=KCHAR+1: IF KCHAR>MAXCHAR THEN KCHAR=MAXCHAR: GOTO 1055
1080 PRINT CHAR#;: S$=S$+CHAR#: GOTO 1055
1085 IF KCHAR=0 THEN RETURN
1090 KCHAR=KCHAR-1: LOCATE,START+KCHAR: PRINT CHR$(32);: LOCATE,START+KCHAR
1095 S$=LEFT$(S$,KCHAR): RETURN
1100 '
1105 ' errors
1110 '
1115 IF ERL=890 THEN LOCATE,H(6,G): PRINT "file not found": FILE$(G)="":
    FL(G)=1: RESUME 265
1120 IF ERL=945 THEN LOCATE,H(6,G): PRINT "file not saved": FILE$(G)="":
    FL(G)=1: RESUME 265
1125 ON ERROR GOTO 0
1130 '
1135 ' initialize arrays
1140 '
1145 FOR C=0 TO 1: FOR R=0 TO 7: READ H(R,C): NEXT R,C
1150 DATA 88,88,88,144,113,2,4,6
1155 DATA 176,176,176,232,201,22,24,36
1160 FOR C=0 TO 1: FOR R=0 TO 4: READ V(R,C): NEXT R,C
1165 DATA 35,35,35,91,16
1170 DATA 35,35,35,91,16
1175 FONT(0)=%HF800: FONT(1)=%HFC00: RETURN

```

NEW FONTS

```

100 ' program PROPRINT.BAS to print with proportional spacing
110 ' Hugh S. Jackson, 1984. All commercial rights reserved by author.
120 '
130 DEFINT A-Z: SCREEN 1: COLOR 9,1: CLS
140 '
150 DEF SEG=&H17B0 'segment at 94K
160 F3X5=0: BLOAD "FONT3X5.BIN",F3X5 'set font names to offsets
170 F4X7=&H400: BLOAD "FONT4X7.BIN",F4X7 'and load fonts
180 '
220 '
230 A$="ABCDEFGHJKLMNOPQRSTUVWXYZ" 'set examples to be printed of
240 B!=123.4567: C=890 'string, real & integer values
250 '
260 '
270 FONT=F3X5: KOLOR=2 'select font and color
280 PRESET (80,70) 'locate starting point
290 S$=A$+STR$(B!)+STR$(C) 'assign string values to S$
300 GOSUB 390 'gosub to print routine
310 '
320 '
330 IF INKEY$="" THEN 330
340 SCREEN 0,0: WIDTH 80: END
350 '
360 '
370 ' subroutine to print horizontally
380 '
390 FOR I=1 TO LEN(S$) 'cycle thru each char of string
400 CHAR=ASC(MID$(S$,I,1)) 'get ascii value of each char
410 FOR ROW=0 TO 7 'cycle thru each row of cell
420 BYTE=PEEK(FONT+CHAR*8+ROW) 'get bit-mapped byte for row
430 MASK=&H80 'start with mask=10000000B
440 FOR COL=1 TO 8 'cycle thru bits, left to right
450 PIXEL=BYTE AND MASK 'if bit tested is "on" then
460 IF PIXEL THEN PIXEL=KOLOR 'pixel=f'ground else b'ground
470 PRESET STEP(1,0),PIXEL 'move to next pixel & paint it
480 MASK=MASK\2 'shift mask one bit to right
490 NEXT COL
500 BITS=BITS OR BYTE 'collect bit-width of character
510 PRESET STEP(-8,1) 'reset for next row
520 NEXT ROW
530 '
540 FOR PITCH=8 TO 1 STEP -1 'to get width of character
550 IF BITS MOD 2=1 THEN 590 'locate rightmost bit in BITS
560 BITS=BITS\2 'by testing for odd number
570 NEXT PITCH 'shift BITS one bit to right
580 'until low-order bit is "on"
590 IF PITCH<>0 THEN PITCH=PITCH+1: GOTO 610 'set inter-character space to 1
600 IF CHAR=32 THEN PITCH=5 'set default for special case
610 PRESET STEP(PITCH,-8) 'reset for next character
620 BITS=0
630 NEXT I: RETURN

```

Figure 4: A listing for loading fonts to print with proportional spacing.

```

100 ' program BIOPRINT.BAS to print using BIOS print routines
110 ' Hugh S. Jackson, 1984. All commercial rights reserved by author.
120 '
130 DEFINT A-Z: SCREEN 1: COLOR 9,1: CLS
140 '
150 DEF SEG: CLEAR,&HFB00 'reserve 2K memory for 2 fonts
160 F4X6=&HFB00: BLOAD "FONT4X6.BIN",F4X6 'set font names to offsets
170 F5X7=&HFC00: BLOAD "FONT5X7.BIN",F5X7 'and load fonts
180 '
190 DEF SEG=0 'segment for interrupt vectors
200 POKE &H7E,PEEK(&HS10):POKE &H7F,PEEK(&HS11) 'point graphics char set vector
210 ' 'to BASIC's data segment
220 '
230 A$="ABCDEFGHJKLMNOPQRSTUVWXYZ" 'set examples to be printed of
240 B!=123.4567: C=890 'string, real & integer values
250 '
260 '
270 FONT=F4X6: KOLOR=1 'select font and color
280 LOCATE 8,1 'locate starting point
290 S$=A$+STR$(B!)+STR$(C) 'assign string values to S$
300 GOSUB 390 'gosub to print routine
310 '
320 '
330 IF INKEY$="" THEN 330
340 SCREEN 0,0: WIDTH 80: END
350 '
360 '
370 ' print subroutine
380 '
390 DEF SEG=0 'segment for interrupt vectors
400 POKE &H7C,VAL("&h"+RIGHT$(HEX$(FONT),2)) 'point graphics char set vector
410 POKE &H7D,VAL("&h"+LEFT$(HEX$(FONT),2)) 'to offset of font selected
420 DEF SEG: POKE &HAE,KOLOR 'reset to BASIC's segment and
430 ' 'set color (interpreter only)
440 FOR I=1 TO LEN(S$) 'cycle thru each char of string
450 PRINT CHR$(ASC(MID$(S$,I,1))+128); 'add 128 to ascii values to get
460 NEXT I: RETURN 'chars from upper half of set

```

Figure 5: A listing for loading fonts to print using BIOS print routines.

ing example in Figure 5 prints horizontally; it can be recoded to print vertically with a few changes in the PRESET statement's instructions:

```

470 PRESET STEP
(0,-1),PIXEL
510 PRESET STEP (1,8)
610 PRESET STEP
(-8,-PITCH)

```

Similarly, code can easily be developed to print diagonally. The "footprint" can be reduced if you are displaying small fonts. The coding in the example paints a full 8×8 pixel character cell, but if you don't need a cell this large for your characters, the ROW and COL loops can be shortened. For example, if you are using a 4×6 pixel font, the widest characters (such as M and W) will probably be five pixels wide. Add to this one pixel for intercharacter spacing, and required cell width is six. If your characters are all uppercase you won't need descenders, so the cell can be 6×6 pixels. To code for a cell this size, make the following changes:

```

410 FOR ROW=0 TO 5
440 FOR COL=1 TO 6
510 PRESET STEP (-6,1)
610 PRESET STEP (PITCH,-6)

```

A Reduced "footprint" brings an additional benefit: increased print speed. In this case, the 6×6 pixel cells print nearly 40 percent faster than 8×8 pixel cells.

To get the benefits of minimum "footprint" and maximum speed automatically, you can make the print routine adjust itself to the font you have selected. Determine the size of a normal uppercase character at each entry into the routine and using this information to set appropriate parameters in the ROW and COL loops and in the PRESET statements.

And, of course, the ultimate enhancement: Code the print routine in assembly language and print your new fonts with the "speed of light." ■

Hugh S. Jackson has 20 years experience in data processing.

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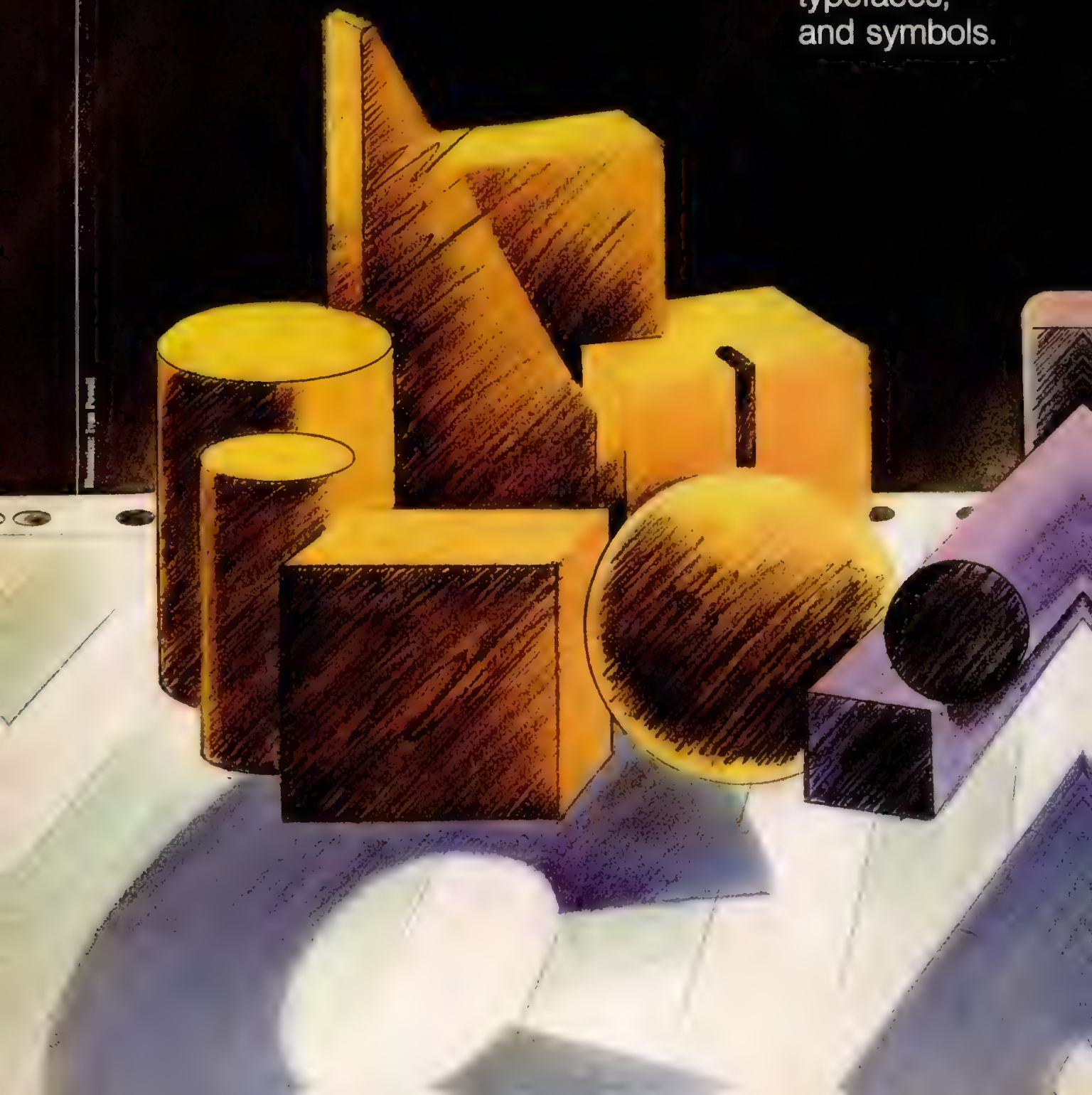
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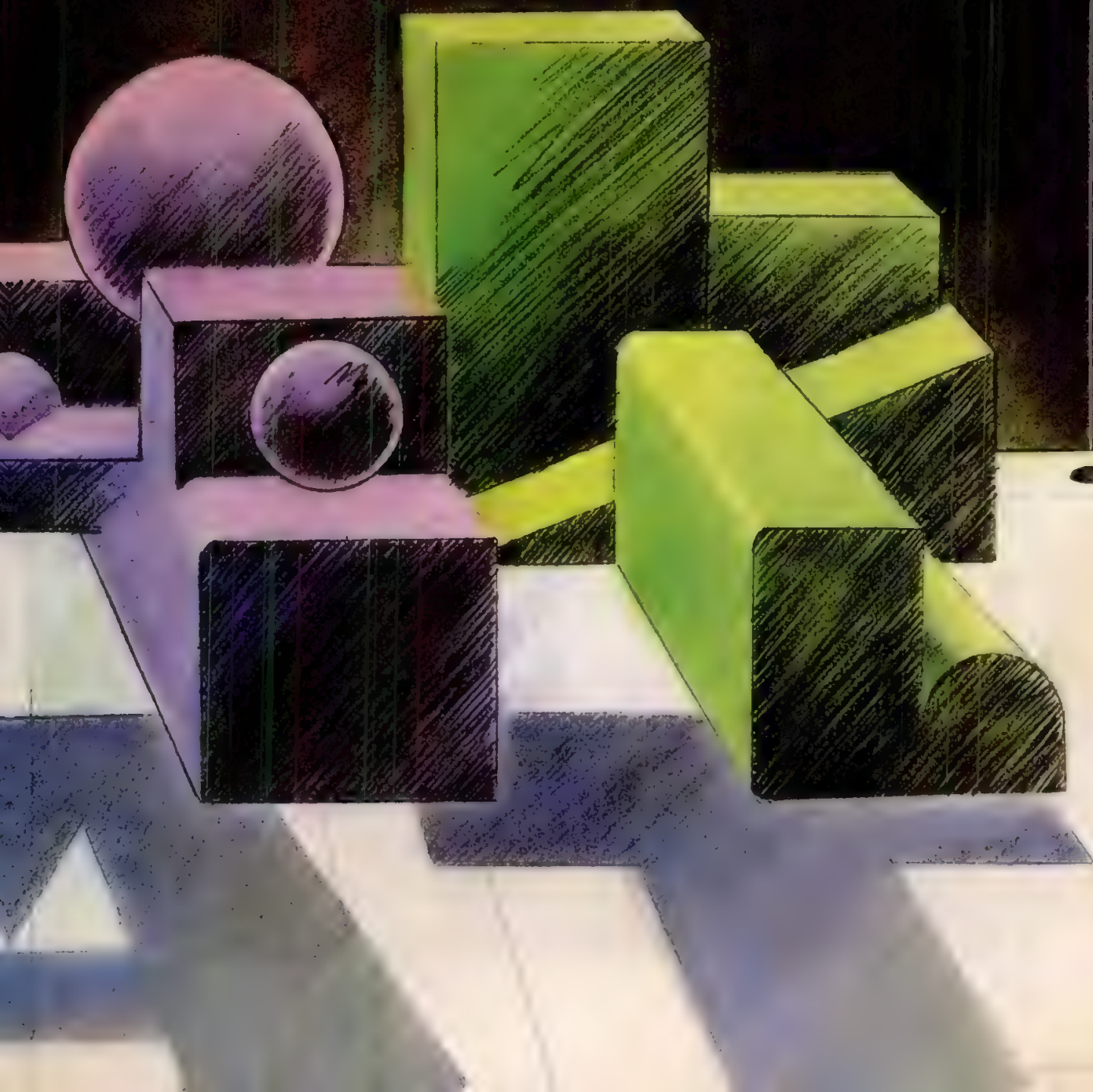
A printer with
downloading
capability lets
you create
your own
logos,
typefaces,
and symbols.



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DOWNLOADING

Building Your Own Characters



Are you getting tired of seeing the same old characters on your dot matrix printer? If so, there may be an easy and inexpensive solution. Many of the newer dot matrix printers will download character sets, allowing you to redefine any of the standard characters into whatever dot configuration you choose. You could, for example, define the standard copyright symbol to print in place of the @ sign or print your company logo in place of the asterisk. And if you're really ambitious, you can create an entirely new typeface.

Hardware Requirements

Not all dot matrix printers have the capacity to download new characters. In fact, most don't. A printer that allows downloadable characters must have memory to store character definitions. New definitions are stored in the printer's random access memory (RAM), and may be selected or deselected with a simple command sequence.

Many owners of printers with downloading capability ignore this feature, either because they don't know about it or because it seems too complicated. Unfortunately, downloading is not given much attention in most printer manuals, and it looks more complicated than it really is.

And, as is usually the case for printers, there is no standardization. Every printer that is capable of downloading does it in a slightly different way. They use different dot matrix sizes, different methods of defining the dot patterns, and different commands.

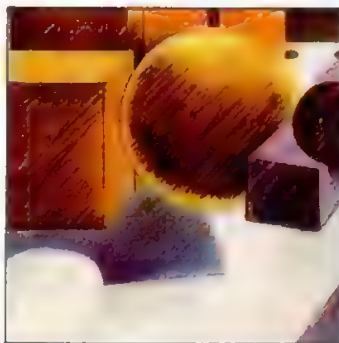
Some popular printers that allow downloading of character sets include Star Micronic's Gemini-10X/15X and Delta 10/15, Epson's FX-80/100, and most Okidata printers, including the Microline 92/93.

Why Download?

Most dot matrix printers with downloading capability include several built-in typefaces or fonts. For example, you can usually select a standard character

set, italics, or one of several foreign language character sets. Each of these fonts may be printed in different sizes—pica, elite, condensed, or enlarged. The result is a tremendous variety of styles and sizes, suitable for many different needs.

But you may not be satisfied with your printer's built-in character sets and type styles. A downloading capability opens the door to new printing styles, letting you create custom typefaces or special symbols that may be useful for printing technical material.



Each profession has its own symbols. Downloading lets you intermix them with normal text.

Each profession has its own symbols, and downloading lets you intermix them with normal text when printing. To do this, you simply download the standard character set and then substitute special symbols for rarely used built-in characters—for example, the tilde sign (~) or backslash (\). Although the built-in characters will appear on the screen, they will print in the new dot configuration.

There are other methods of printing different characters. Specialized typeface programs such as *Fancy Font* and *Type Face* use the graphics mode of the printer to produce a wide variety of typefaces and sizes. These programs allow you to print

elaborate characters in a wide range of sizes, but they use more memory, and the output is very slow.

Downloaded characters, on the other hand, will print at your printer's normal speed, and the only extra memory required is your printer's RAM. One drawback is that downloaded characters have a very limited resolution, so the characters you create can't be very complex.

How Downloading Is Done

Although the basic concepts are similar, printers use different methods of getting and storing new character definitions. The examples provided here are based on Star Micronic's Gemini-10X/15X printers. (See sidebar, "The Lowdown on Three Printers," for a comparison with Epson's FX-80/100 and Okidata's Microline 92/93 printers.)

When you send information to your printer, several things happen. First, your printer looks at the value of the incoming signal. If it's anything but ESC (ASCII value 27), it searches its read only memory (ROM) for the character's dot pattern and prints it. If an ESC character has been sent, though, your printer knows that a special command is coming, and the characters that follow are treated differently. Your software uses escape sequences for all of your printer's type styles and formatting features, such as condensed print, double-strike, italic font, left margin setting, and so on.

It should come as no surprise that escape sequences are the key to the downloading process. There are escape sequences for defining a character, selecting the downloaded character set, downloading the normal character set into the download RAM, and turning off the download character set to return to the normal character set.

Before downloading a character, we must somehow define the new character. The character matrix for the Gemini printer has nine dots across and seven dots vertically. So it's a simple matter to draw in dots to form the new character, right? Not

quite. There is one restriction: in non-graphics mode the printer can't print two adjacent horizontal dots, so no two dots can be placed next to each other in a single row. And to provide for characters with descenders ("y," for example), you should specify that you want the entire matrix shifted down two dots.

On many printers, it's difficult to distinguish zeros from the letter "O." To make it easier to tell them apart, I'll define a new zero character that has a slash through it. Figure 1 shows a dot pattern for the new character. The numbers along the left side of the matrix are the basis for the code used to tell the printer which dots make up the new character. Each number along the bottom of the matrix is the sum of the code numbers for each row that contains a dot. These nine numbers (one for each column) completely describe the new character to the printer. If all this seems complicated, don't despair—later on, I'll present a method to simplify this process. After all, why do all this work manually when you have a computer?

Escape Sequences

As you'll recall, an escape sequence tells the printer how to handle the characters that follow. Figure 2 lists the Gemini escape sequences for downloading characters in generic form and in BASIC translation. Figure 3 is a complete BASIC program that will download the new slashed zero character.

The first step is to download the normal character set into the download RAM (Line 50); if this isn't done, nothing would print except the new character. Next, the new character must be defined for the printer (Line 60). This new character definition will overwrite the standard dot configuration for zero in the printer's RAM (but not in its ROM). After this, the download character set is activated (Line 70). Now whenever you send the printer a zero, it will print the new character. Line 90 cancels the download character set and returns to the normal characters (with the unslashed zeros).

An Easier Way

The process described above is a lot of work to go through just to get a slash through a zero. It's tedious to draw the dot pattern on paper and add up the codes manually. Trying to remember all the escape sequences seems impossible, and it makes for error-prone printing. And once you get the sequence figured out, it's not very convenient to have to load BASIC and run the program just to download a character set. Fortunately, there's an easier way.



When you think the character looks right, you can test it on the printer before saving it.

Figure 4 is a listing of FONTEDIT, a BASIC program that works on any IBM PC or XT system with an 80-column monitor. The program serves as a character font editor and a simple program generator for downloading character sets. Although I wrote it for Gemini printers, it can be modified to work with other printers that have downloading capability. Consult your printer manual for the proper escape sequences, matrix size, and dot coding methods.

FONTEDIT is menu-driven and very easy to use. First, you designate a file to contain the download information. You are then presented with a blank matrix and

some simple instructions. Use the arrow keys to position the cursor to a location where you would like a dot, and hit the F10 key to place a dot in the matrix. If you change your mind, you can remove dots with the space bar. When you think the character looks right, you can test it on the printer before saving it. If it's satisfactory, you can save it to a file.

The file that FONTEDIT creates is actually a new BASIC program. It includes comments so you can see exactly what's going on, and you can even go back and remove a character if you change your mind. FONTEDIT automatically generates all the escape sequences for downloading characters and leaves you with a program that's ready to run.

You can download from one to 96 characters (the limit for Gemini-10X/15X) and continue editing a file at a later time. If you are adding new definitions to an existing file, FONTEDIT will ask you for the next line number.

Line 60 is the basis of the editor, which allows use of the built-in BASIC editing functions and saves a lot of programming. The LINE INPUT statement keeps accepting input until a Return is entered. You can use the arrow keys to move the cursor around the matrix and the F10 key to place a dot at the cursor's location. When you hit the Return key, control passes to statement 70, which calls the next menu.

The dots placed on the screen are read directly from the screen memory using the PEEK function. The code numbers are added together in lines 370-460, and written to the file with the appropriate CHR\$ keywords.

Downloading from BASIC

When you are finished using FONTEDIT, a brand new program will be on your disk, filed under the name you gave when you started FONTEDIT. As with any BASIC program, you can load it, list it, or modify it. When you run this new program, it will download your new character definitions to your printer. It will also send the proper escape sequences to load

DOWNLOADING

the normal characters into download RAM so any undefined characters will not print as blanks.

After running your new program, the characters that you redefined will print as your new dot configurations. To return to the normal characters, you can send the escape sequence to cancel the download character set or to turn your printer off and then back on.

You can save as many of these programs as you like, as long as they're filed under different names. You can then select a new character set simply by running the appropriate BASIC program.

Downloading from DOS

Although FONTEDIT makes the downloading process much easier, it still doesn't solve the problem of having to load BASIC to download a character set. There are several ways, however, to download new characters directly from DOS. One solution is to compile the new BASIC program. This works, but it will create a much larger file than is necessary. And most people haven't shelled out the cash for a BASIC compiler.

A better solution is to modify the new BASIC program. The modification involves changing the program so it will write all the necessary information to a disk file rather than to the printer. This is done by changing all the LPRINT statements to PRINT #1 statements. This new file can then be sent to the printer directly from DOS using the COPY command.

If your program contains many definitions, you'll want to use a text editor or word processor to make the substitutions. Here's how to do it. First, make sure the new BASIC program that FONTEDIT created is in ASCII format. If you've modified and saved the program, you'll have to load it and resave it with the following BASIC commands:

```
LOAD "CHARS.BAS"
SAVE "CHARS.BAS",A
```

(This assumes the program created by FONTEDIT is named CHARS.BAS.)

Code Numbers	1		X		X		X		X	
	2	X						X		X
	4	X					X			X
	8	X				X				X
	16	X			X					X
	32	X		X						X
	64		X		X		X		X	
		62	65	32	81	8	69	2	65	62

Figure 1. Dot pattern for the slashed zero character. Dots will print in the positions marked with X. Note that no two dots may appear next to each other horizontally.

ESC # 0	CHR\$(27) CHR\$(42) CHR\$(0)	Copy the fonts in character ROM into download RAM.
ESC # 1 c d1 v1 v2 ... v9	CHR\$(27) CHR\$(42) CHR\$(1) CHR\$(c) CHR\$(d1) CHR\$(v1) CHR\$(v2)... CHR\$(v9)	Define the download character into RAM.
ESC \$ 1	CHR\$(27) CHR\$(36) CHR\$(1)	Select the download character set.
ESC \$ 0	CHR\$(27) CHR\$(36) CHR\$(0)	Cancel the download character set.

Notes: c is the ASCII value of the character being redefined.
d1 is 1 if the character has a descender, 0 otherwise.
v1 through v9 are the ASCII values of the nine code numbers (see Figure 2).

Figure 2. Escape sequences (and their BASIC equivalents) used in downloading new characters to the Gemini-10X/15X printer.

```
10 REM This program downloads one new character to the
20 REM Gemini printer, tests it, then cancels the download
30 REM character set.
40 LPRINT "The zero does not have a slash: 00000"
50 LPRINT CHR$(27);CHR$(42);CHR$(0); 'downloads the normal character set
60 LPRINT CHR$(27);CHR$(42);CHR$(1);CHR$(48);CHR$(0);CHR$(62);
  CHR$(65);CHR$(32);CHR$(81);CHR$(8);CHR$(69);CHR$(2);
  CHR$(65);CHR$(62); 'Redefines zero to have a slash
70 LPRINT CHR$(27);CHR$(36);CHR$(1); ' Select the download
  character set
80 LPRINT "The zero should now have a slash: 00000"
90 LPRINT CHR$(27);CHR$(36);CHR$(0); 'Cancel download
  character set
100 LPRINT "Now it's back to normal: 00000"
110 END
```

Figure 3. A BASIC program to download the slashed zero character.


```

10 'FONTEDIT.BAS      A character editor for downloading character sets
20 '                  (This version is for Gemini-10X/15X printers)
30 '                  (C) 1984, John Walkenbach
40 GOSUB 840          ' Initialize & set-up function keys
50 GOSUB 500          ' Clear screen and label character matrix
60 LINE INPUT ED$    ' This statement is the character editor
70 GOSUB 90           ' When <RETURN> is hit, get new menu
80 GOTO 60            ' Return to editing
90
100 '-----
100 ' Subroutine to generate the Options Menu
110 '-----
120 LOCATE 22,1:COLOR 0,7
130 PRINT"F1 Save redefinition to file          F2: Clear the matrix.  "
140 PRINT"F3 Exit FONTEDIT                     F4: Test character on printer "
150 PRINT"F5 Continue editing matrix          "
160 COLOR 7,0
170 LOCATE 1,1:INPUT "Press a function key, then <RETURN>: ",F$
180 IF F$="Save" THEN GOSUB 240 GOTO 230
190 IF F$="Clear" THEN GOSUB 500 RETURN
200 IF F$="Exit" THEN CLOSE #1:CLS:END
210 IF F$="Test" THEN GOSUB 710 GOTO 230
220 IF F$="Continue" THEN GOSUB 620 RETURN
230 FOR R=1 TO 2:LOCATE R,1:PRINT SPACES(70):NEXT R:GOTO 170
240
250 '-----
250 ' Subroutine to read the screen and write to file (SAVE option)
260 '-----
270 LOCATE 1,1:PRINT SPACES(70):LOCATE 1,1
280 INPUT "Character to be redefined: ",C$
290 INPUT "Descender (y/n)? ",DE$
300 OPEN FILE FOR APPEND AS #1
310 PRINT #1, LINENUM,"REM - Redefines ",C$:LINENUM=LINENUM+10
320 PRINT #1, LINENUM:
330 PRINT #1,"LPRINT CHR$(27);CHR$(42);CHR$(1);CHR$("ASC(C$)");CHR$(
340 IF DE$="Y" OR DE$="y" THEN PRINT #1,"1);' descender"
350 LINENUM=LINENUM+10:PRINT #1, LINENUM:"LPRINT "
360 ' Alternate entry point to read screen - used for TEST option.
370 FOR SCRNLOC=1668 TO 1668+((MATCOLS-1)*2) STEP 2
380 CODE=0
390 N=-1
400 FOR OFFSET=0 TO (MATROWS*160) STEP 160
410 N=N+1
420 IF PEEK(SCRNLOC+OFFSET)=220 THEN CODE=CODE+(2*N)
430 NEXT OFFSET
440 IF TEST=TRUE THEN LPRINT CHR$(CODE):GOTO 460
450 PRINT #1, "CHR$("RIGHT$(STR$(CODE),LEN(STR$(CODE))-1);");"
460 NEXT SCRNLOC
470 IF TEST=FALSE THEN PRINT #1:LINENUM=LINENUM+10
480 CLOSE #1
490 RETURN
500
510 '-----
510 ' Subroutine to clear screen and label rows & columns (CLEAR option)
520 '-----
530 CLS:LOCATE 9,35:PRINT LEFT$("12345678901",MATCOLS)
540 LOCATE 10,34
550 PRINT CHR$(201);FOR I=1 TO MATCOLS:PRINT CHR$(205);NEXT I:PRINT CHR$(187)
560 FOR I=11 TO 11+MATROWS-1
570 LOCATE I,31
580 PRINT I-10;CHR$(186);SPACE$(MATCOLS);CHR$(186)
590 NEXT I
600 LOCATE I,34
610 PRINT CHR$(200);FOR I=1 TO MATCOLS:PRINT CHR$(205);NEXT I:PRINT CHR$(188)
620 ' Alternate entry point - used for CONTINUE option
630 LOCATE 22,1:COLOR 0,7
640 PRINT"Use arrow keys to move to desired dot location.  "
650 PRINT"Press F10 to set a dot... Space bar to remove a dot. "
660 PRINT"Press <ENTER> for Options Menu "
670 COLOR 7,0
680 LOCATE 1,1:PRINT SPACES(70);
690 LOCATE 11,35
700 RETURN
710
720 '-----
720 ' Subroutine to test character on printer (TEST option)
730 '-----
740 LOCATE 1,1:PRINT SPACES(70):LOCATE 1,1:INPUT "Character to replace? ",C$
750 LPRINT CHR$(27);CHR$(64); 'Reinitialize printer
760 LPRINT CHR$(27);CHR$(42);CHR$(0); 'Select normal character set
770 LPRINT CHR$(27);CHR$(42);CHR$(1);C$;
780 IF DE$="Y" OR DE$="y" THEN LPRINT CHR$(1); ELSE LPRINT CHR$(0);
790 TEST=TRUE
800 GOSUB 360
810 LPRINT CHR$(27);CHR$(36);CHR$(1) 'Select downloaded set
820 LPRINT "Here is a test of the new character: "
830 FOR I=1 TO 20:LPRINT C$,NEXT I:LPRINT 'Print 20 times
840 TEST=FALSE
850 RETURN
860
870 '-----
870 ' Subroutine to initialize and set up function keys
880 '-----
890 TRUE=1:FALSE=0
900 WIDTH "scrn";80:CLS:KEY OFF
910 FOR I=1 TO 10:KEY I, " ":NEXT I
920 KEY 1, "Save": KEY 2, "Clear": KEY 3, "Exit"
930 KEY 4, "Test": KEY 5, "Continue": KEY 10, CHR$(220)
940 ' Determine display adapter (8800 for color/graphics, 8000 for monochrome)

```

(continued)

The ".A" will save the program as an ASCII file, which allows you to use it as input to a text editor or word processor.

If you're using a word processor, make sure it can read and write standard ASCII files (use nondocument mode in *WordStar*). Run your editor and load the BASIC program. Add a new first line to the program as follows:

```

1 OPEN "CHARS.SET"
FOR OUTPUT AS #1

```

Substitute the name of your choice for CHARS.SET. I've found that using the .SET extension makes the downloadable files easy to recognize in a directory. Next, do a global search and replace. Substitute "PRINT #1," for every occurrence of "LPRINT". Finally, add a new last line to the program:

```

999 CLOSE #1

```

Save the file, exit your text editor, and get back into BASIC. Now you must run the program one last time. This time it will write a new file, CHARS.SET, that contains all the information for downloading the character set. And you can do it from DOS:


```

A>COPY CHARS.SET LPT1:

```

If your printer is set up as a serial device, you may have to substitute COM1: or PRN: for LPT1:. If the program is short, you can avoid using the text editor and make the modifications manually with the BASIC editor. This is also handy for sending other escape sequences to your printer, such as those for condensed printing, double-strike, italic font, and so on.

Examples of Downloading

 We've developed several complete character sets using FONTEDIT (see Figure 5 for samples). FONTEDIT does speed things up considerably. For example, I was able to edit all the characters in the "hi-tech" typeface to my satisfaction in about 2 hours. If I did it manually, I'd probably still be working on it.

(continued)

DOWNLOADING

```

950 DEF SEQ=0
960 IF (PEEK(&H410) AND &H30) <> &H30 THEN DEF SEQ= &H8800 ELSE DEF SEQ=&H8000
970 MATCOLS=9 'Number of dot matrix columns
980 MATROWS=7 'Number of dot matrix rows
990 LOCATE 3,35:PRINT "FONTEDIT.BAS"
1000 LOCATE 22,1:INPUT "File for output? (1-8 characters) ",FIL$
1010 IF FIL$="" THEN BEEP: GOTO 1000
1020 FIL$=FIL$+".BAS"
1030 INPUT "New file or append (n/a)? ",TYPE$
1040 IF TYPE$="a" OR TYPE$="A" THEN INPUT "Line for 1st new statement? ",LINENUM
1050 LINENUM=10
1060 OPEN FIL$ FOR OUTPUT AS #1
1070 PRINT #1, LINENUM:"REM - Download normal character set":LINENUM=LINENUM+10
1080 PRINT #1, LINENUM:"LPRINT CHR$(27);CHR$(42);CHR$(0);":LINENUM=LINENUM+10
1090 PRINT #1, LINENUM:"REM - Select download character set":LINENUM=LINENUM+10
1100 PRINT #1, LINENUM:"LPRINT CHR$(27);CHR$(36);CHR$(1);":LINENUM=LINENUM+10
1110 CLOSE #1:RETURN

```

Figure 4. A program listing for FONTEDIT.BAS, a font editor and simple program generator for downloading character sets to Gemini-10X/15X printers.

There's really no reason to settle for boring typefaces if your dot matrix printer allows downloading. You can create foreign language characters or entire alphabets. Or you can redefine all uppercase letters to print as their lowercase equivalent—an e.e. cummings emulator. If you're not interested in developing new typefaces, you can create just about any symbol you need for professional writing. It's not as complicated as it seems; using your PC to help makes it even easier. ■

The "Load Down" on Three Printers

Although the basic principles are the same, few printers use the same protocols for downloading character sets. Here are the character coding methods and escape sequences used by three popular dot matrix printers.

If you've ever used more than one vendor's printer, you've probably noticed a simple fact: there are no standards for printers. Each printer possesses different characteristics and capabilities. Different vendors' printers also use different escape sequences—the means by which software tells the printer what to do. So it's not surprising that printers manufactured by different vendors differ in the way they handle downloaded characters.

Most printers that permit new character sets to be downloaded have escape sequences to perform this function. Usually the escape sequences vary from printer to printer. Printers also differ in the size of their characters (that is, the number of dots in each character horizontally and vertically) and how they code the dots.

I have compared three popular dot matrix printers (Epson FX-80/100, Star Gemini-10X/15X, and Okidata Microline 92/93) in the areas of matrix size, dot coding, and escape sequences to show how different these downloading

features can be from one vendor's printer to another's.

Matrix size is the number of dots, horizontal and vertical, that comprise a character. When designing characters to be downloaded, you can use only a limited number of columns for a character. This number is almost always the same number of columns that a regular char-

acter uses and varies from printer to printer. In addition, no two horizontal dots may be immediately adjacent. The Star Gemini-10X/15X's character size is 7×9 dots, the Epson FX-80/100's is 8×11 dots, and the Okidata Microline 92/93's size is 7×11 dots.

Printers also differ in the manner in which they assign the codes for the dot

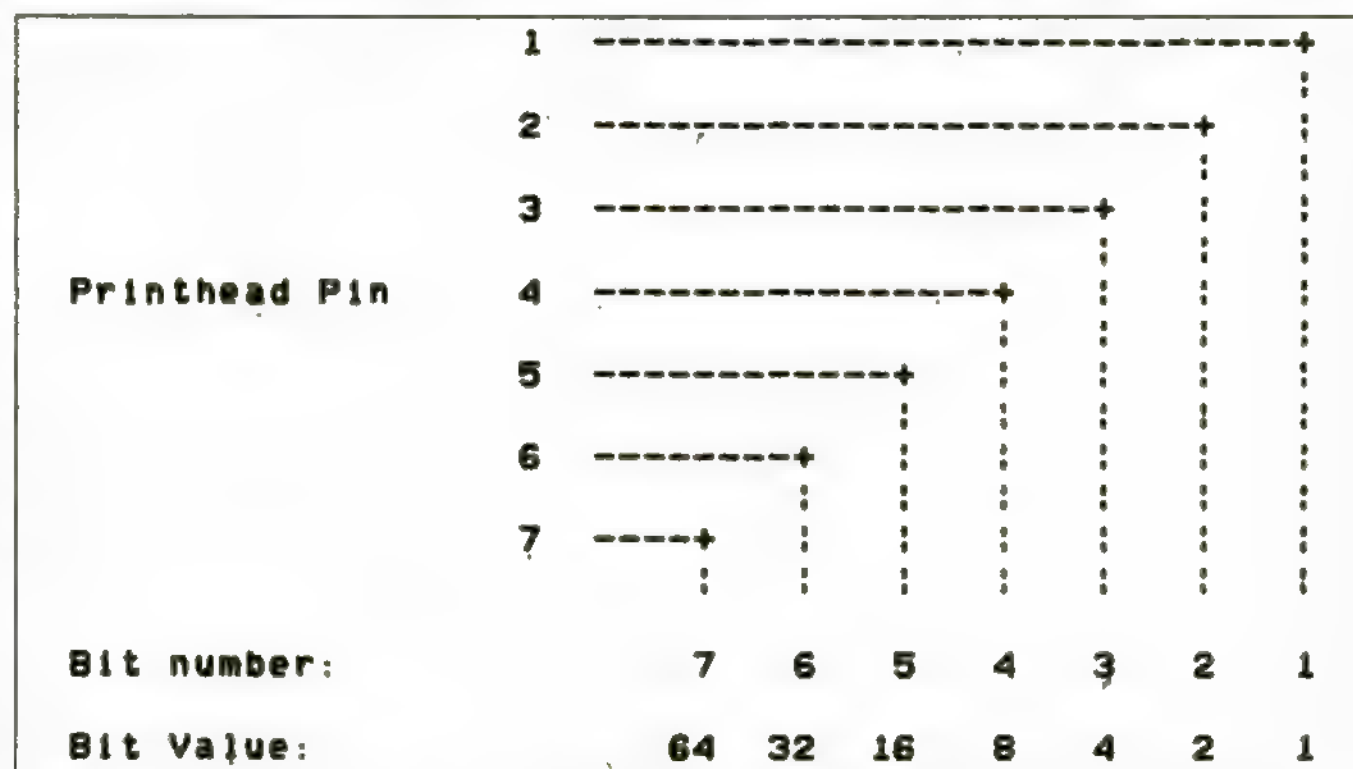


Figure A: A map of how the Star Gemini-10X/15X and the Okidata Microline 92/93 translate the printhead pin pattern into row positions.

patterns. A code for a particular downloaded character consists of a series of numbers, each number corresponding to the dot pattern for a column. For example, the FX-80/100 and the Microline

92/93 both require 11 numbers to define a character (one for each column of dots). The Gemini, which prints with less resolution, requires only nine numbers for definition.

The numbers that you supply in your character definitions are simple decimal translations of the binary pattern of the pins on the printhead. Again, not all vendors' printers translate this pattern in the same way. For example, the FX-80/100 printer considers the upper pin to be the most significant bit—it uses the opposite method from that of the Gemini-10X/15X and Microline 92/93. The Gemini and Microline printers translate the values into row positions as in Figure A. But the FX-80 uses just the opposite translation, as you can see in Figure B.

Obviously, column values will be the same for the Gemini and Microline. But since they have a different number of columns, the Microline requires one additional number. The Microline and FX-80 have the same number of columns, but use different translation methods. In short, it is very difficult to translate downloadable characters from one printer to the next, especially if you do it manually.

Another difference among these three printers is the escape sequences they use to download characters. Figure C is a summary of the specific escape sequences used by each.

Glossary

- c1 = Beginning range of the character being replaced (FX-80/100 allows a definition to replace more than one character.)
- c2 = Ending range of the character that is being replaced (c1 can equal c2)
- a = Special attribute byte for descender and proportional spacing information
- v = Value of a single column of code numbers
- c = ASCII value of character being replaced
- d1 = 0 if there is no descender, 1 if there is a descender
- d2 = A if there is no descender, D if there is a descender—J.W.

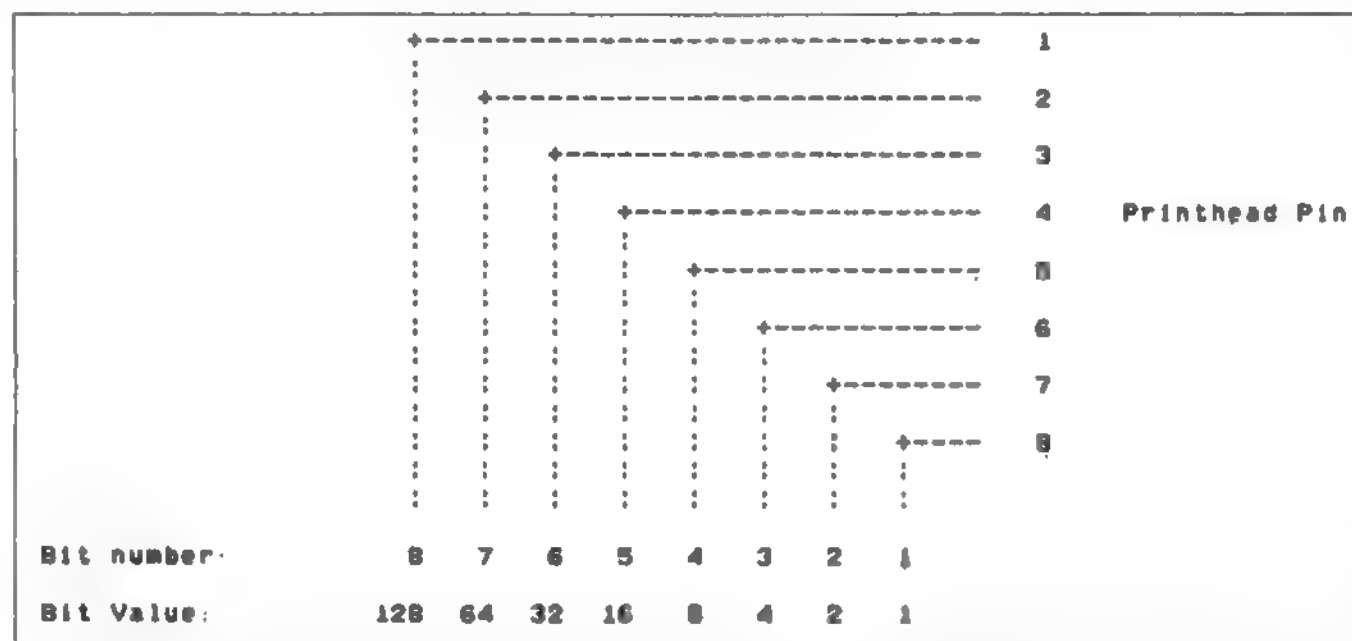


Figure B: The Epson FX-80/100 uses an opposite translation method from the one used by the two other printers shown in Figure A.

To copy ROM fonts to the download RAM:

Gemini-10X/15X	ESC * 0
FX-80/100	ESC : 0 0 0
Microline 92/93	N/A

To select the download character set:

Gemini-10X/15X	ESC * 1
FX-80/100	ESC % 1 0
Microline 92/93	ESC 2

To define a download character into RAM:

Gemini-10X/15X	ESC * 1 c d1 v1 v2 ... v9
FX-80/100	ESC & 0 c1 c2 a v1 v2 ... v11
Microline 92/93	ESC % d2 c v1 v2 ... v11

To deselect the download character set:

Gemini-10X/15X	ESC * 0
FX-80/100	ESC % 0 0
Microline 92/93	ESC 0

Figure C: A summary of the escape sequences for three popular dot matrix printers.



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Building Financial Models: **VENTURE and PLAN 80**

These two new modeling packages are more complex and powerful than any spreadsheet program.

When shopping for a new program, most people already know what they want the software to do. The challenge is to find the best program for the job. Unfortunately, there is rarely a "best" program for any given application. In the business world, a program that might be perfect for a small company might not meet the needs of a large corporation. One person might need greater flexibility in a software package, while another could better use one whose capabilities are limited.

For financial modeling, you have many alternatives. Not only are there plenty of spreadsheet programs to choose from, there are also packages specifically designed to handle complex financial forecasting. In some ways, these forecasting packages can be easier or more efficient to use than many spreadsheets.



Illustration: Jeffrey J. Smith

This article compares two financial modeling packages, *VENTURE* and *PLAN80*. However, I won't be reviewing every detail of each package's design and operation. And, rather than telling you which is the better program, my goal is simply to give you enough information to help you decide which is best for you or whether either will be helpful at all.

Both of these programs are powerful and complex. They bring the power of mainframe financial modeling packages to the desktop microcomputer. Both have very similar memory and disk drive requirements. Both also require that you know a great deal about the finances of your company.

Financial Modeling

Financial modeling is a complex application originally developed on large mainframe computer systems. The term covers a range of activities designed to help managers and consultants forecast the financial future of a business. At the simplest level, a financial modeling package can take a current income statement or balance sheet and, applying given assumptions, forecast the figures for future months, quarters, or years.

Balance sheets and income statements can be handled by typical spreadsheets, but financial modeling programs often go much further. They also can produce detailed projections for production, sales, cash flow, assets and depreciation, and

VENTURE (Version 4.2)

Weiss Associates, Inc.
127 Michael Dr.
Red Bank, NJ 07701
(201) 530-9260

List Price: \$495 (includes demonstration system, which can be purchased separately for \$15)

Requires: 192K RAM, one double-sided disk drive (or two single-sided drives, or one disk drive and hard disk). Printer optional but recommended.

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return on investment. Another important strength of these programs is that they usually make it easy to produce similar reports for a number of divisions and then consolidate the many reports into a single summary report for the entire company. While these are features that can be duplicated using a standard spreadsheet, it would be much more difficult and time-consuming to design the necessary templates.

Financial modeling programs take a wide range of financial details and perform numerous complex calculations to create the projections. To make full use of these programs you must know the initial figures and the assumptions that you wish to test, and you must understand the concepts the program uses to create the projections. The complexity of these packages will become clearer as we examine each one in depth.

VENTURE

The concept behind *VENTURE* is that there are a dozen basic reports that any financial planner might want to create. These reports have been designed into the *VENTURE* system. You then "flesh out" these skeletons with the actual figures and assumptions for your company. Once you have entered the data, the program makes the appropriate calculations and can then display or print them as you choose.

You start *VENTURE* by calling up the program on a floppy disk called the Loader Disk. This is a copy-protected disk that must be used at the start of each session. The main system program may be copied (and in fact should be copied) and may be installed on a hard disk if you have one. You may then call up an existing model or create a new one.

When you create a new model, the structure that *VENTURE* imposes on your model design immediately becomes apparent. You are asked to enter which of the four types of product account data you want to use as the basis for your model. The prompt also offers the option L for LIST. If you press L, the screen will show the following:

PRODUCT METHODS

1. PRODUCT VOLUME, PRODUCT PRICE
2. PRODUCT SALES
3. MARKET VOLUME, MARKET SHARE, PRODUCT PRICE
4. MARKET SALES, MARKET SHARE

This screen means that you may define your projections in terms of any one of these four combinations of variables. You choose the one for which you have the best data, and then *VENTURE* will later ask you to describe the individual products in those terms. For example, if you select the first option at this point, you will then be expected to supply the volume and price figures for each product.

You are then asked for the first period and the number of periods to be used in the forecast. You may use months, quarters, or years, and *VENTURE* will format all the reports accordingly. Before you can add the data to your new model, you must first define the accounts that will be used in the calculations.

Just as it has the four predefined "product methods" for you, *VENTURE* also has 12 different account types for the data that you can enter:

1. Products
2. Variable costs
3. Fixed costs
4. Long term assets (COGS)
5. Distribution costs
6. Operating costs
7. Other costs
8. Long term assets (operating)
9. Current assets
10. Current liabilities
11. Predefined accounts
12. Tax adjustments

You decide how many accounts you wish to include in each category and the units you wish to use to define the data. For example, variable costs may be entered as straight dollars, as a percent of product sales, as a dollar value per unit volume of product, or as a percent of some other variable cost account. Since the *VENTURE*

VENTURE AND PLAN80

<div> <div>PAGE 1</div> <div>10/01/83</div> <div>10:55</div> <div>-MA-</div> <div>(\$1,000'S)</div> </div> <div> <div>REPORT 1</div> <div>VENTURE FINANCIAL PLANNING & ANALYSIS SYSTEM</div> <div>WIDGET COMPANY STRATEGIC PLAN</div> </div> <div>INCOME STATEMENT</div>										
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
SALES	8,038	8,190	9,042	10,150	10,810	11,633	12,405	12,878	13,384	13,924
VARIABLE COSTS	3,195	2,937	2,972	3,380	3,603	3,796	4,049	4,169	4,298	4,417
GROSS PROFIT COMT.	4,842	5,251	6,070	6,770	7,207	7,837	8,356	8,709	9,085	9,507
FIXED COSTS	150	152	154	156	158	160	163	165	167	170
TOTAL COSTS	3,345	3,089	3,126	3,536	3,761	3,957	4,212	4,334	4,465	4,607
DEPRECIATION (COGS)	913	1,375	1,438	1,500	1,563	1,675	1,688	1,100	1,111	1,125
COST OF GOODS SOLD	4,258	4,464	4,564	5,036	5,324	5,032	5,300	5,434	5,578	5,712
GROSS MARGIN	3,780	3,734	4,479	5,114	5,486	6,601	7,105	7,444	7,806	8,192
DISTRIBUTION COSTS	225	232	367	424	456	497	533	555	578	603
NET MARGIN	3,555	3,503	4,112	4,690	5,030	6,104	6,572	6,889	7,227	7,589
OPERATING COSTS	125	128	142	154	157	166	175	181	187	193
OPERATING PROFIT	3,430	3,375	3,969	4,535	4,873	5,938	6,397	6,708	7,040	7,396
DEPRECIATION (OPER)	-	-	-	-	-	-	-	-	-	-
OP PROFIT LESS DEPR.	3,430	3,375	3,969	4,535	4,873	5,938	6,397	6,708	7,040	7,396
OTHER COSTS	193	223	143	143	143	143	144	144	144	144
GAIN (LOSS) ON DISP.	-	-	-	-	(1,000)	-	-	-	-	-
INTEREST EXPENSE	2,234	2,109	1,969	1,812	1,702	1,439	1,219	973	697	388
PRE-TAX EARNINGS	1,002	1,042	1,857	2,580	2,027	4,355	5,034	5,592	6,200	6,864
LOCAL TAXES	50	52	93	129	101	218	252	280	310	343
SUB TOTAL	952	990	1,764	2,451	1,926	4,137	4,782	5,312	5,890	6,521
FEDERAL TAX	438	456	812	1,127	886	1,903	2,200	2,444	2,709	3,000
INV. TAX CREDITS	225	105	105	105	105	25	25	25	25	25
OTHER TAX CREDITS	100	100	100	100	100	100	100	100	100	100
NET INCOME	839	740	1,158	1,529	1,245	2,359	2,708	2,994	3,305	3,646
BEGIN RET. EARNINGS	350	964	1,204	1,612	2,140	2,135	2,994	3,952	4,945	6,001
NET INCOME	839	740	1,158	1,529	1,245	2,359	2,708	2,994	3,305	3,646
CURRENT DIVIDENDS	225	500	750	1,000	1,250	1,500	1,750	2,000	2,250	2,500
RETAINED EARNINGS	964	1,204	1,612	2,140	2,135	2,994	3,952	4,945	6,001	7,147

Figure 1: A sample VENTURE report.

program already includes all the required equations, it can perform the calculations as soon as you have given it the data and defined the units.

For example, you may define five different product accounts (in the tutorial included with the package, *VENTURE* uses five different sizes of widgets). You may then define one variable cost account as "labor." Since labor is needed for all five products, you may choose to define labor cost as dollars per unit volume of product. The program would then relate this account to all five products. Another variable cost account might be a material used only in the large and small widgets. You would also define this account as dollars per unit volume of product, but it would only relate to two of the five products. Fringe benefits are another variable cost, but you would define it as a percentage of other variable costs and would relate it to the labor costs.

Once you have defined the accounts and their relationship to the other accounts, you are finally ready to enter the data. Here you have additional options.

For each account, you enter an initial amount; *VENTURE* will prompt you with the correct units definition that you specified when you first defined the account. You may enter specific values for future periods, an increment to be added to the initial value for each period, a percent growth value, or the number of periods in which you want that value repeated.

In some cases, the data entry is more complex. For example, when entering an asset account, you must specify the depreciation method, depreciable life, period of switch-over from accelerated depreciation (or let *VENTURE* calculate the optimal year), investment tax credit, and the disposal year. You have the choice of nine different depreciation methods, or you may define your own schedule in either dollars or percents.

Once all the data are entered in the accounts, you may then view the results. You can examine any single account, a whole group of accounts in a single account type, or all the accounts in the model. You may also choose from 12 predefined reports:

1. Income statement
2. Percent of sales statement
3. Detailed income statement
4. Cash flow and return on investment
5. Net present value/discounted cash flow return worksheet
6. NPV / DCF sensitivity analysis
7. Long term assets and depreciation
8. Working capital
9. Balance sheet
10. Financial ratios
11. Source and application of funds
12. Historical balance sheet

You can even choose to print all 12 reports at one time to get a comprehensive series of forecasts. (See Figure 1 for sample *VENTURE* report.)

After you finish building the model, you can go back and add to or change any of the accounts. You may also change the data for any or all the accounts. In this way, you can use the same model to test a series of assumptions and evaluate the benefits of alternative plans.

Working with VENTURE

VENTURE makes a complex task manageable. It would be very difficult to perform a similar task by hand and it could take a long time to set up equivalent templates with a spreadsheet program.

One fact is clearly evident: This well-designed program was rewritten specifically to run on the IBM PC. It makes full use of the computer's many features, which greatly enhances its ease of use. For example, *VENTURE* uses all ten PC function keys, not just once, but three or more times each. It assigns major commands to the function keys in a logical manner, and learning its few commands takes very little time. *VENTURE* also uses the *PrtSc* (Print Screen) key in two different ways: as a standard screen dump, using the *Shift-PrtSc* key combination, and as a toggle switch to send all screen listings continuously to the printer, using the *Ctrl-PrtSc* key combination. This second screen print feature is especially useful for creating

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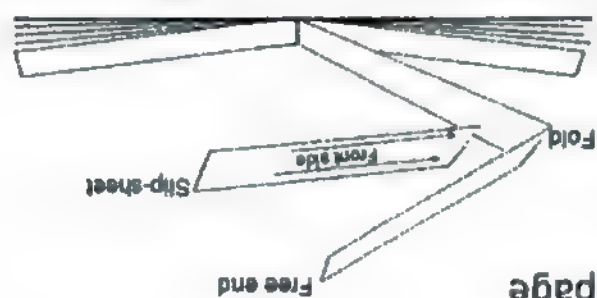
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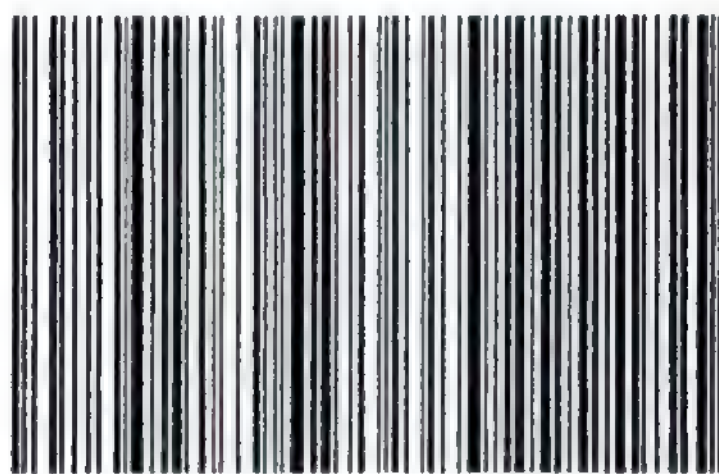
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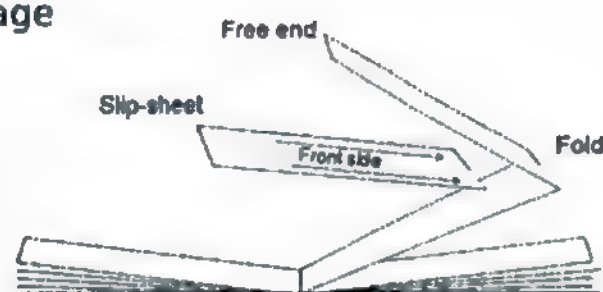


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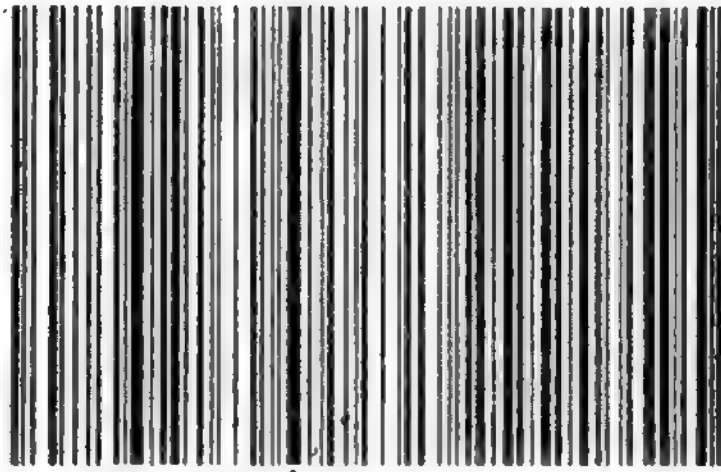
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1. Follow instructions on the other side

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VENTURE AND PLAN80



"ad hoc" printed reports of certain accounts, rather than using one of the pre-formatted reports.

Perhaps *VENTURE*'s most impressive design feature is that it will automatically use an 8087 coprocessor chip if you have it installed in your PC. This 80-bit chip takes over the mathematical calculations from the main 8088 processor and can speed up applications that involve many calculations. According to *VENTURE*'s documentation, the most complex report takes 5.5 minutes to calculate and print without the 8087 installed. When the same model is used with an 8087, the report takes less than 2 minutes to calculate and print.

VENTURE has other features that are not specific to the IBM PC, but that still make it easier to use. It gives you clear prompts at almost every decision point, and should you need more detail, you can use its extensive on-line help feature. This feature can describe the details for a command or list the accounts for the section you are working with at the time. *VENTURE* also has a *VIEW* command that will load a report into memory, and you can then scroll through it, much like a standard spreadsheet (although you cannot change the values with the *VENTURE* screen). You move using the numeric keypad. The first key you press indicates the number of cells to move through while the

second is the cursor direction. In other words, you do not need to keep pressing the NumLock key and trying to remember if you are in the number mode or cursor control mode.

VENTURE includes many other fine features. For example, it has a command to reroute reports to a text file on a disk so that you may use them with your word processor. Another command allows you to send escape codes to your Epson printer to control the different typeface options. You can set the time and date, which are automatically printed on all reports so that you can see which is the most recent. You can even use a function key to enter a terminal mode so that you can use the computer to get data from another computer.

The *VENTURE* documentation is good, with plenty of examples showing how to use the different commands. The section on reports explains the calculations used and the significance of some of the values the program produces. The manual's seven-page appendix explains some financial concepts and shows some tricks for using *VENTURE* more efficiently. A separate tutorial booklet is included that introduces you to most of the program's basic features and encourages you to experiment with the example models that are provided on a demonstration disk.

A few details of *VENTURE* are annoying. The most important one is that you may not enter negative values using the minus sign (hyphen). According to the manual, use of this key "will produce unpredictable results." Instead, you must use the F10 key. Pressing this key causes a small superscripted 2 to appear on the screen, which signifies that the value is negative. Fortunately, when *VENTURE* displays results on the screen or in a printed report, the negative values are shown in more conventional ways (you can select either the hyphen or brackets).

PLAN80

While *VENTURE* is a complete and self-contained package, *PLAN80* has a very different concept behind its design.

Rather than burden you with the programmer's opinions of what you should want in your financial model, *PLAN80* gives you all the building blocks you need to produce your own models.

In one sense, *PLAN80* is not so much a program as it is a financial planning programming language. To use it, you must first generate a text file containing all the commands, titles, data, and formulas required to define the model. You then load *PLAN80*, which evaluates the text file. You may then work with the model in a number of different ways.

To develop a financial model, you use a text editor (such as the EDLIN program on the PC-DOS master disk, or most word processors) to create a text file that defines your model. *PLAN80* has more than 16 different commands that you must include in the text file that you create. Almost all the files must start with the same three commands: *TITLES*, *COLUMNS*, and *ROWS*.

Under *TITLES*, you specify the words that are to be printed at the top of the model. You may specify that the titles are to be printed on any of the first nine lines on the page. You may also specify that they be printed all the way to the left or right; the default setting is to have them centered on the page.

The next step is to name the columns using the *COLUMNS* command. Here you give a name to each column, up to eight characters long, and the text that you want to have printed at the top of each. You may also specify page formatting, number of decimal places, and whether a preceding dollar sign (or trailing percent

PLAN80 (Version 2.7)

Business Planning Systems

2 N. State St.

Dover, DE 19901

(302) 674-5500

List Price: \$295

Requires: 192K RAM (128K under DOS 1.1), one disk drive. Printer optional but recommended.

CIRCLE 733 ON READER SERVICE CARD

VENTURE AND PLAN80

sign) should be printed.

Under ROWS, you name the rows and give them labels just as you do for the columns. Under DATA, you enter the data for specific rows (or columns). You can enter a string of specific values that will fill a row, with each value filling one cell of that row. You can also describe a mathematical series, such as the one created by increasing an initial value by a fixed value or a percentage. You can even have a value duplicated across a portion or the entire row.

The bulk of the definition work is done under the RULES command. Here you may define the contents of one row (or column) as the mathematical function of other rows. As with a standard spreadsheet, you may specify arithmetic functions (addition, subtraction, multiplication, and division) using cells, ranges of cells, and constants. For example, the Sales row could be defined as equal to the Units row times the Price row (see Figure

1). As with a standard spreadsheet, you may call on one or more built-in functions. *PLAN80* has 28 different functions, including sum, minimum, maximum, integer part, fractional part, logarithm, and trigonometry functions. It also offers functions for loan amortization, internal rate of return, net present value, and five different depreciation methods.

PLAN80 has commands that determine whether the resulting model will be displayed on the screen, printed on the printer, or written to the disk. It also has commands that control which rows or columns are included in a display of a printed report and that allow you to extract and combine portions of different models to create consolidated models.

Once you have written the text file using these commands and stored it on the disk, you start the *PLAN80* program by typing "PLAN80." If you specify the filename of the model to be used (such as "PLAN80 EXAMPLE"), that model will automatically load. Otherwise, you will be prompted for the name of the file you wish to use.

Generally, you will want to use the data display mode, which shows the model with all the data and resulting calculations on the screen. Once in this mode, you can move the cursor around the screen and change any value you choose. You can also call up a menu of options that covers the display and print formats, recalculating, printing the model (on the printer or on a disk), and the graphics mode. A *PLAN80* printout is shown in Figure 2. The graphics mode allows you to create a graphic model of the data using standard typed characters (not high-resolution graphs, unlike some of the newer integrated spreadsheet packages).

The most powerful feature of *PLAN80*'s design is its ability to link different models. This feature makes it possible to create a procedure file that calls up different models in sequence, performs calculations, prints the results, and then extracts key data to be included in the next model you call. Using this feature, you

could consolidate data from a group of divisions or calculate a projection based on the results of another projection. In the literature that comes with the program, one example creates sales forecasts for three regions and summarizes them, develops budgets for three cost centers and makes a summary, develops a production and inventory schedule based on projected sales, and uses all of these other parts to create a projected income statement, balance sheet, and cash flow forecast. Once you create this model, you can change the data without too much trouble and repeat the process as often as needed.

Working with PLAN80

PLAN80 is a complex program that allows you to produce detailed reports based on almost any mathematical model that you can describe. It permits much more report formatting control than typical spreadsheet programs, and its ability to build files of commands makes it attractive for lengthy and complex operations.

PLAN80 is not as well suited for creating less complex, one-page applications such as those a standard spreadsheet can handle. As we have seen, the commands must be created in a separate text file before you can run them with *PLAN80*, and they are probably a bit more difficult to learn than those of a spreadsheet, since you are not working interactively to "paint the screen" with your data and formulas. If the application is complex, or if the reports should be carefully and attractively designed, then *PLAN80* offers some important advantages.

Another point about *PLAN80* that deserves mention is that its publishers are offering multiple user licenses. These licenses make it less expensive to honor the copyright laws. Strictly speaking, if you have more than one computer hooked up to a network, and they all have access to a program, you should purchase one copy of the program for each computer. However, paying full price for each package in this situation seems unreasonable to some people. Under *PLAN80*'s multiple

```

:TITLES
1 "PLAN80 EXAMPLE #1"
2 "Five Year Profitability Model"
: COLUMNS
Y1981 "1981"
Y1982 "1982"
Y1983 "1983"
Y1984 "1984"
Y1985 "1985"
: ROWS
UNITS          "ASSUMPTIONS"
PRICE (2)      "Units"
UCOST (3)      "Price"
TAXRT (3)      "Unit Cost"
SALES          "Tax Rate"
               "DOLLARS (THOUSANDS)"
COST           "Sales"
OVERHEAD       "Cost of Sales"
PBT (-)        "Overhead"
TAXES (-)      "Profit Before Tax"
NET (-)        "Taxes"
               "Net Income"
OPM (1)        "MARGINS (PERCENT)"
NPM (1)        "Gross Profit"
               "Operating Profit"
               "Net Income"
: DATA
UNITS          = 100 118 (*1.20)
PRICE          = 1.32 1.49 (*1.10)
UCOST          = .818 .919 (*1.12)
TAXRT          = .46 +
OVERHEAD       = 19 19 (*1.08)
: INTERACTIVE
: RULES
SALES          = UNITS * PRICE
COST           = UNITS * UCOST
PBT            = SALES - COST - OVERHEAD
TAXES          = TAXRT * PBT
NET            = PBT - TAXES
               = 100 * (SALES - COST) / SALES
OPM            = 100 * PBT / SALES
NPM            = 100 * NET / SALES
: OPTIONS
ROWWID(19)
: DISPLAY

```

Figure 2: Text file input for a *PLAN80* profitability model.

VENTURE AND PLAN80

user licenses, you need only two packages for up to three users, three packages for up to nine machines, four for up to sixteen, and so on. Business Planning Systems deserves credit for trying to solve this problem.

On the other hand, *PLAN80* is a package that clearly shows its CP/M heritage. It uses none of the IBM PC's special keys. Instead of using the cursor keys to control movement on the display screen, you must use the I-J-K-M diamond of keys. Instead of using the PgUp, PgDn, Home, or End keys, you must use letter keys, such as H for Home. According to the documentation, the program's error messages are simply numeric codes that you must then go and look up. While these limitations may have been necessary when using 8-bit CP/M machines, it seems as though room could have been found for more informative error messages in the version designed for the PC.

PLAN80's graphics mode is helpful, but not too impressive. It shows curves by plotting with the digits 1, 2, and 3 to represent the three data sets that may be plotted at one time. It dictates the scales that you may select and thus may not produce a graph of sufficient quality for a formal presentation.

The *PLAN80* manual is not written specifically for MS-DOS, so it includes some information that is ambiguous or irrelevant. For example, it contains a section on installing the program for your terminal even though the disk provided is "preinstalled" for the PC. (A note to that effect is included in the package.)

The manual also makes it difficult to get to know *PLAN80*. The first two chapters do include introductory material, but the remaining chapters are devoted to explaining the commands in detail. You have to go to Appendix C to learn how to load a model into *PLAN80*, and then to Appendix A to see the example models that are included in the package. Since you create the procedure text files outside of *PLAN80*, there is no opportunity for the program to include on-line help screens: You will need to use the manual if you get stuck. The manual includes plenty of examples and an index at the back.

Conclusion

So should you buy either of these packages? The answer depends, of course, on what you plan to do with them.

VENTURE's strengths make it well suited for the manager who wants to create detailed projections about the financial

state of a company without descending a long learning curve to master the program. It allows you to focus on the problem while it handles all the formulas, calculations, and formatting. It also handles consolidation of different models.

VENTURE is not for you if you have special requirements that it can't handle. With its 12 reports and all their variations, this program can handle a wide range of situations, yet yours may be one of the few that won't fit its prearranged structure.

PLAN80 is not just for financial modeling, although it's best at producing complex forecasts. It allows you to create your own report formats, your own formulas, and even your own graphs (although they are limited). It has the ability to chain commands together that create and update models in sequence, thus automating complex analysis procedures. Also, like a standard spreadsheet, it allows you to play "what if" games and then recalculate to see the results.

PLAN80's disadvantage is that it is not an interactive program: You must create the files using your own text editor. You must switch back and forth between your editor and *PLAN80* if you need to make changes in your file; this problem could be alleviated with a RAMdisk or a memory partitioning utility that would allow both programs to be available at all times without reloading from disk.

PLAN80 is considerably more difficult to learn than *VENTURE*, both because *PLAN80* is more flexible, and because it is not as well designed as *VENTURE*.

Each program has features that would recommend it to different people. *VENTURE* is best for the business person who wants a structured planning tool for financial projections. *PLAN80* is more appropriate for the competent computer user who wants a powerful system that can automate spreadsheet applications, especially consolidated financial forecasts. ■

Alfred Poor is president of softIndustries, an independent microcomputer consulting firm in Woodbury, Connecticut.

PLAN80 EXAMPLE #1 Five Year Profitability Model					
	1981	1982	1983	1984	1985
ASSUMPTIONS					
Units	100	118	142	170	204
Price	1.32	1.49	1.64	1.80	1.98
Unit Cost	0.818	0.919	1.029	1.153	1.291
Tax Rate	0.460	0.460	0.460	0.460	0.460
DOLLARS (THOUSANDS)					
Sales	132	176	232	306	404
Cost of Sales	82	108	146	196	263
Overhead	19	19	21	22	24
Profit Before Tax	31	48	66	88	117
Taxes	14	22	30	41	54
Net Income	17	26	36	48	63
MARGINS (PERCENT)					
Gross Profit	38.0	38.3	37.2	36.1	34.9
Operating Profit	23.6	27.5	28.4	28.8	29.0
Net Income	12.8	14.9	15.3	15.6	15.6

Figure 3: A printout of the *PLAN80* model created with the input shown in Figure 2.

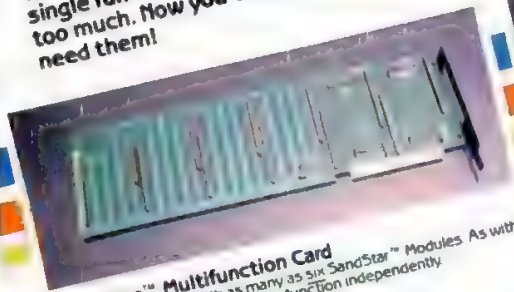
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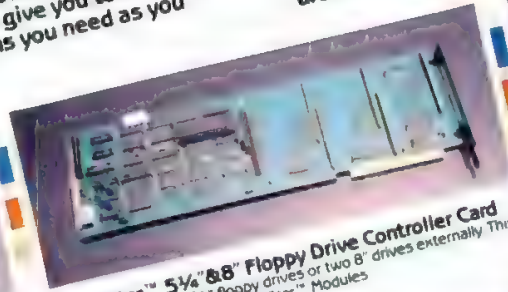
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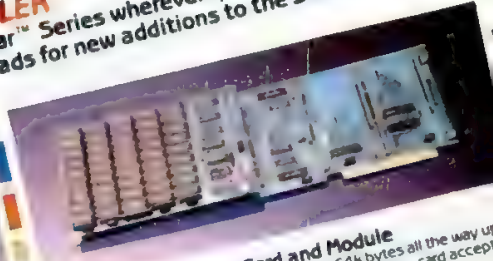
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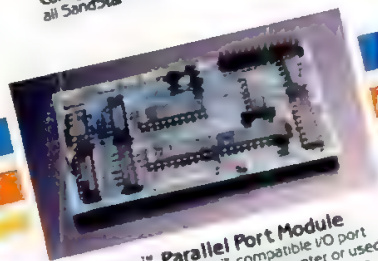
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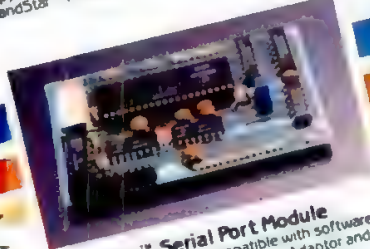
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SandStar™ Parallel Port Module
This port is a Centronics™ compatible I/O port which may be used to connect a printer or used as a general purpose I/O port. IBM diagnostics will run on this module.



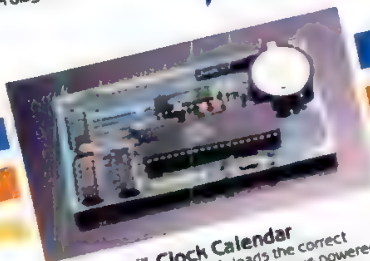
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This module interfaces to any SASI (or your PC to any SCSI) compatible device such as the Xebec Hard Disk Controller.



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This module is totally compatible with software written for the IBM Asynchronous Adaptor and may be used to connect to a MODEM, serial printer or any device using a standard RS232-C interface. The port may be configured as Serial Port #1 or #2.



SandStar™ Hard Disk Controller Module
This module provides an interface between IBM PC and the industry standard ST-506 hard disk drives. Includes ECC (error checking and correcting).



SandStar™ Clock Calendar
This module automatically loads the correct time and date each time the system is powered up. The clock and calendar are equipped with battery back-up and run even when the power is turned off. Software included.



SandStar™ Prototype Module
This module can be used to create prototype designs which can be installed in the IBM PC.



SandStar™ Game Adaptor Module
With this module you can attach up to four paddles or two joysticks. It may also be used with four digital inputs and four analog inputs for general purpose graphic applications. It uses the same type 15 pin "D" subminiature I/O connector as the IBM Game Control Adaptor.



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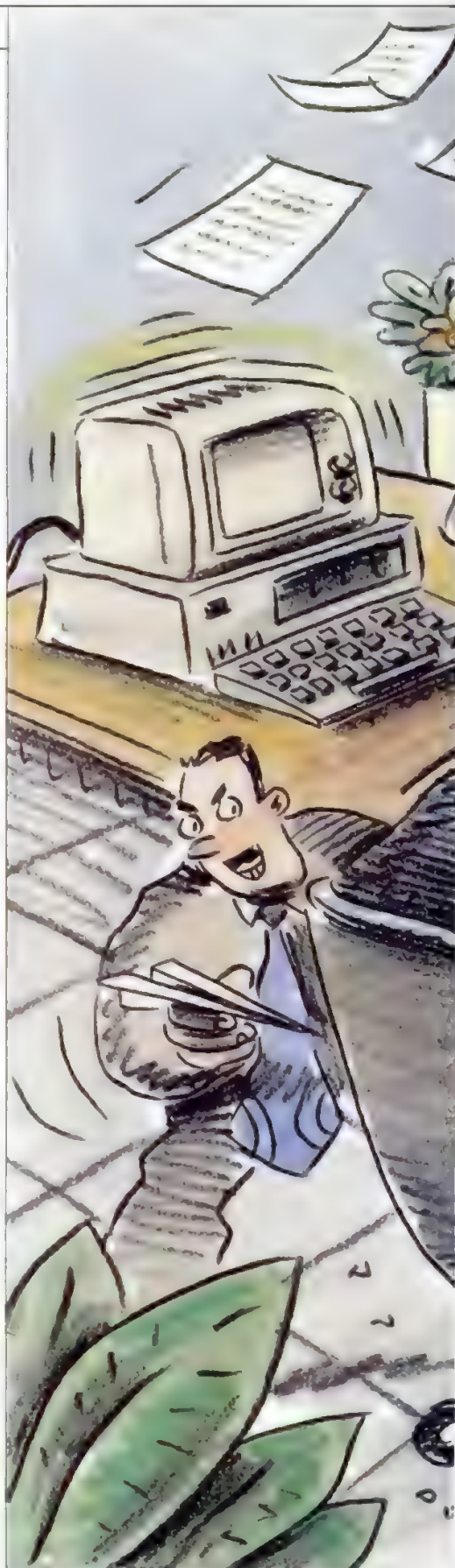
Taking The Pain Out Of Planning

MAC-PAC/PC will help a manufacturing business reconcile its needs in the factory, sales department, and controller's office.

Picture a walnut-paneled boardroom. It's the third week of the month, and the company president is holding the monthly meeting with the executive planning committee. On the expansive conference table sits a PC, its fan calmly humming as it waits to serve the powerful people seated at the table. The marketing and manufacturing executives hand the president their monthly forecasts. In a flurry of typing, the changes from last month's forecasts are entered, and the PC starts to calculate the

consequences. The controller objects to an increase in inventory. The marketing VP disagrees—the inventory is needed to support customers. The manufacturing VP wants more information about the availability of a key raw material and asks the PC how many tons will be required.

Alternative figures are discussed and entered into the PC. As the PC crunches out new numbers, more arguments ensue, but eventually an agreement is reached. The printer hums as it produces sales, production, and profit projections.





MAC-PAC/PC

There is at least one system on the market capable of playing the PC's role in this boardroom scenario. Bearing the unlikely name of *MAC-PAC/PC*, it was written and is now marketed by Arthur Andersen & Company, one of the "Big Eight" accounting firms.

Planning in manufacturing businesses is a complicated job. The lead times required to get materials and assemble them into products must be considered. Raw materials requirements and projections from sales and production plans must be calculated; and cost structures and pricing schemes can be complex.

By taking care of the calculations, *MAC-PAC/PC* (short for Manufacturing-Planning and Control) makes the planning process faster and easier. The program is specifically designed to help a manufacturing company reconcile its needs in the factory, the sales department, and the controller's office. Given information about the time, money, and other resources required to manufacture a product, the system makes financial projections to help planners develop monthly production and sales plans.

As alternatives are explored, *MAC-PAC/PC* keeps projections up to date so planners know the probable consequences of their decisions. Once the planning is finalized, the rest of the organization can use *MAC-PAC/PC*'s reports as a guide for their operations.

Before you can use *MAC-PAC/PC*, you must build a database that describes your company and its products. This database includes information about products,



their components, and the resources required to build them. In a large company, setting up the database may take several weeks.

The program's planning is done by the product line; therefore, establishment of the database begins by identifying your company's product lines with names and numbers. You also define a "service policy" for each product line: either make-to-stock, assemble-to-order, or build-to-order. You can also define product line groups. The definition of product lines is pretty much up to you. *MAC-PAC/PC* permits a product line to be as narrow as a single product or as broad as you like. For testing purposes, I invented a furniture company that makes chairs, upholstered sofas, and both standard and custom-built wood bars. I defined three product line groups: chairs, sofas, and bars. Within the chair group, lines of captain's chairs, ladder-back chairs, and rockers were defined, all with a make-to-stock service policy. The sofa product group consisted of residential and commercial product lines, both assemble-to-order. The bar product group contained a make-to-stock line of home bars, a make-to-stock line of standard commercial bars, an assemble-to-order line of special commercial bars, and a make-to-order line of custom built bars. This structure was intended to contain a

variety of inventory that would test *MAC-PAC/PC* as thoroughly as possible.

Adding Components

Once product lines and groups have been entered into the database, you must define the most important component parts and the average amounts used in each product line.

Any resource used in production—not just materials—can be defined as a component of one or more product lines. For example, if design engineering time is scarce in your company but some of it is required as part of every sale in a product line, you might want to tell *MAC-PAC/PC* that each unit sold requires a certain number of hours of design engineering time. Design engineering then becomes a valid component for *MAC-PAC/PC*'s purposes, and the system will calculate the total number of engineering hours required by your production schedule.

In general, all of your company's important resources should be components for *MAC-PAC/PC*'s purposes. You might include raw materials, tooling, equipment, specially skilled people, storage space, and even assembly floor space.

When you tell *MAC-PAC/PC* that a particular component is used in manufacturing a particular product line, you must also specify the amount required to make a single finished product. You can enter an average quantity required, and the program allows you to vary that quantity quarterly. For instance, fewer cars sold in the winter contain air conditioners than those sold in the summer. So, if one of your product lines is "cars" and one component is "air conditioners," you might want to specify that the average car contains .7 air conditioners, but also specify quarterly multipliers of 90 percent, 100 percent, 110 percent, and 100 percent for the winter, spring, summer, and fall quarters. *MAC-PAC/PC* will adjust both the air conditioner production plan and your projected financial results for these seasonal variations.

MAC-PAC/PC

Arthur Andersen & Co.
711 Louisiana, Suite 1300
Houston, TX 77002
(713) 237-2205

List Price: First copy, \$2,500;
additional copies, \$500

Requires: 320K RAM, two double-density, double-sided disk drives.

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In addition to product groups, product lines, and component parts, *MAC-PAC/PC* allows you to enter average costs and prices, purchasing, fabrication, and assembly lead times. The cost and price information is used to develop total inventory cost and cost of sales, and to estimate revenue and profit margin. Lead times are used to estimate how long it takes to buy parts and make the product.

Monthly Operation

To use *MAC-PAC/PC* each month, you must enter and maintain both sales and production plans for each product line and for each month of the coming year. Naturally, the first time you use the program, you must completely enter both plans. After that, *MAC-PAC/PC* will "roll" the plans forward at the beginning of the month, and you need only enter planning changes.

As you enter changes in your sales and production plans, *MAC-PAC/PC* maintains monthly inventory projections for an entire year. After an inventory level is set for the first month of the year, the system adds the number of items produced (based on monthly production plans) and subtracts the number of items sold (based on monthly sales plans) to determine inventory levels for subsequent months. Since the calculations are displayed on the monitor as soon as you enter the changes, you know at least some of the consequences of your plans immediately.

Likewise, *MAC-PAC/PC* calculates and displays three "time fences" on the screen as plans are entered. Time fences divide your plan into segments that reflect the impact of planning changes on the shop. For instance, a change in next month's production plan will be harder to achieve, and therefore more costly, than a change 8 months in the future. The shop probably has made commitments for next month, but few for the eighth month.

The first time fence is called the "emergency time fence." Changes to your production plan inside this fence are probably impossible to implement in the

shop and should be avoided at all costs. Between the emergency time fence and the "mix time fence," changes to the plan are possible but will cause significant disruption and expense because other products are already in process.

The third time fence is the "rate time fence." Between the mix time fence and the rate time fence, it is reasonable to change product mix because manufacturing has not been started. But the overall level of production should not be changed since the shop is likely to be staffed and equipped only for the particular rate of production that your previous plan required. Beyond the rate time fence, you can change anything, since this part of the plan is far enough in the future to allow time even for drastic changes in production.

MAC-PAC/PC's Calculations

After entering a large amount of new data and before requesting reports, the user must run two calculations: The first determines aggregate costs, prices, and lead times at the product-line level; the second determines totals and requirements

As you enter
changes in your
sales and
production plans,
MAC-PAC/PC
maintains monthly
inventory projections
for an entire year.

for materials, labor, and overhead, taking the most recent data into account.

When the calculations are done, *MAC-PAC/PC* can produce four basic reports. The first three are available for a product line, a product line group, or for the entire company. The reports are:

- The sales plan, which shows unit sales,

sales revenue, cost of goods sold, and both dollar and percent profit margins;

- The production plan, which reports both unit and cost information including sales, production, target inventory or backlog, and projected inventory or backlog;
- The financial plan, which reports costs and inventories, including purchased inventory, work-in-progress (broken down by material, labor, and overhead costs), finished inventory, and cost of goods sold; and
- The master production schedule, which reports component quantity requirements by product line.

Master production schedule data is maintained on a separate disk. In theory, this disk can be transferred to another computer and used as input to a master production scheduling and materials requirements planning system. Arthur Andersen will provide the layout of the master scheduling disk to users who want to modify their manufacturing system to read it.

Your first cut at a plan will probably be less than satisfactory. *MAC-PAC/PC*, of course, allows you to enter revisions to your plans, product line, and component structures. A rerun of the calculations will produce new reports. By repeating this cut-and-try process, you will eventually have a plan that operating personnel can use as the basis for their monthly planning.

Menus and Screens

MAC-PAC/PC is a menu-driven system. It makes no use of the PC's function keys, preferring one- and two-keystroke commands instead. Unfortunately, *MAC-PAC/PC*'s menus are less than consistent. For instance, in some places the user presses the M key to get back to the previous menu. In other places, the system wants the Ctrl-M combination. In still other places, returning to a menu is the fourth item in a list, so the user presses the 4 key. More consistency would make *MAC-*

PAC/PC easier to learn and use.

Balancing this minor shortcoming, Arthur Andersen has done a nice job of structuring and writing prompts. All are in plain English, and there's rarely any doubt about what the system needs when it asks for input. Unfortunately, the program does not include any type of on-line help. When the prompts do turn out to be inadequate, the manual is your only source of assistance.

MAC-PAC/PC's screens and menus appear in color if you have a color monitor. The system's use of color is generally good, but some numbers appear in light green on a white background. On my Princeton Graphics monitor, and on most other color monitors, this combination makes the numbers nearly impossible to read. Furthermore, there are one or two places in the system where splotches of color inexplicably appear on the screen in the wrong places.

Run Times

Calculation of aggregates and of totals and requirements is a separate process that the user starts by selecting a menu option. For my test database of 3 product groups, 9 product lines, and 35 component items, the calculations took 14 minutes. This seems excessive considering *MAC-PAC/PC*'s 320K memory requirement. What's more, according to the manual, calculations can take up to 90 minutes with a database that approaches the limits of the disk's capacity. In this situation, doing frequent "what-if" analyses with the program is impractical.

MAC-PAC/PC is copy-protected and cannot be used with an XT or other hard-disk computer. And it isn't compatible with all printers either; it triple-spaced reports on my Smith-Corona TP-1 for no discernible reason. Arthur Andersen, however, tells me that they are willing to work with customers who own unusual printers and have been successful in solving printer problems in the past.

The *MAC-PAC/PC* package includes three disks and a manual with 228 pages of

instructions and several appendixes. The manual includes a general description of the system; a section covering assumptions and definitions; a detailed description of procedures for running the system; a reasonably complete written tutorial, which includes a sample database; and an index. Appendixes include an extensive maximum file size table, several detailed discussions of techniques for using the system, sample screen displays, and a too-brief discussion of error messages.

In general, I rate the *MAC-PAC/PC* manual as good to very good. The tutorial assumes a touch more financial knowledge than I have, but it carefully avoids computer lingo so it can be understood by inexperienced users.

Distributed Processing

MAC-PAC/PC is actually only one element of a larger planning system. The complete system is designed to run partly on a mainframe or minicomputer and partly on the PC.

The overall system consists of three parts: *MAC-PAC* is a closed-loop materials requirements planning system for a manufacturing business; *FIN-PAC* provides standard financial support, including general ledger, payroll, payables, and receivables; and *MAC-PAC/PC* is a decision-support system. Both *MAC-PAC* and *FIN-PAC* run on the Hewlett-Packard 3000, the IBM System/34, /36, and /38, the IBM 4300 series, or the IBM 30XX series of computers.

One might expect that systems designed as a family and intended for distributed processing would "talk" to each other. Unfortunately, this isn't the case with the *MAC-PAC* System. *MAC-PAC*, *FIN-PAC*, and *MAC-PAC/PC* are stand-alone orphans, unable to talk to each other in any significant way. If you want your 3083 mainframe to be aware of your president's plans, you have to print the plans on the president's PC and key the reports into the 3083. It sounds like 1962 data processing, but that's the way it is.

MAC-PAC/PC is rigid and deals only

with surface details. Any planning executive worth his salt will want more information than the program provides.

Compared to a spreadsheet system, *MAC-PAC/PC* does have some advantages. The initial set-up process is simplified because there is no model to build. In effect, *MAC-PAC/PC* is the model. More important, it comes with a reasonably comprehensive set of well-structured reports. On the other hand, these advantages can also be viewed as disadvantages. Since the model and the reports are preprogrammed, the flexibility of spreadsheet programs is missing from *MAC-PAC/PC*. This means that your business has to be modeled to match the system, since the model can't be adjusted to match the needs of your business.

Since Arthur Andersen does not offer standard classes for *MAC-PAC/PC*, you may have to make a consulting engagement with the firm, just to get your planning committee started.

Support

Arthur Andersen promises reasonable amounts of telephone support during the early weeks of an installation. The firm also promises to fix overt bugs at no cost to the user. After the system is set up, though, additional support is at your expense. The firm could be the ideal system support organization, though. It has the people, the project management skills, and the resources to help you with any problem you might come across. All you have to do is pay.

MAC-PAC/PC has been on the market for less than a year. In January, Arthur Andersen reported a total of nine users, all of them active. With two exceptions, the companies that are using the system have sales totaling from \$50 million to \$100 million. In my judgment, *MAC-PAC/PC* is more likely to be useful in larger companies like these than in smaller ones. All in all, *MAC-PAC/PC* is a fine product. The system works well and does what it says it will do. Whether or not it's worth the price is up to you. ■

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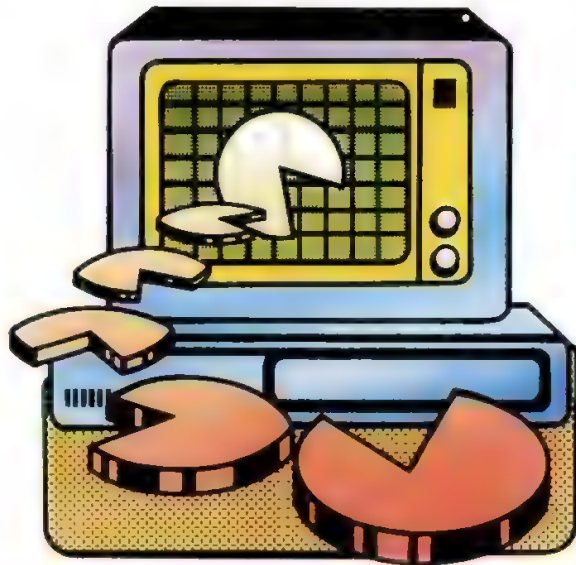
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"A great team"



Energize Your Graphics

Business graphics programs create pie and bar charts, CAD programs create line drawings—and EnerGraphics does both. Its split personality is both powerful and friendly.

Business graphics programs give you the tools to convert your numbers into attractive, expressive, and colorful charts and graphs. Used effectively, graphics can significantly improve an audience's response to your presentation. A 1982 study reported that the use of graphics in business presentations resulted in decision-making meetings that were 28 percent shorter and that used graphics 67 percent of the time.

Business graphics programs generally have fewer capabilities for creating line drawings than computer-assisted design (CAD) software. Most CAD programs

can't make bar charts and pie charts, but they excel at creating line drawings such as blueprints and schematic diagrams, and they provide many special features to help you make those drawings.

EnerGraphics, distributed by Enertronics Corporation, is a hybrid; it's a graphics program that concentrates on business graphics but also provides good CAD capabilities and can create three-dimensional drawings.

You can use *EnerGraphics* to build pie charts, two- and three-dimensional bar charts, three-dimensional figures, and flat line drawings. The chart-building portion

of the program can quickly produce a variety of charts from the data you enter. The two-dimensional drawing program lets you rotate symbols, enlarge and reduce drawings, and enter text to accompany the drawings you create. A symbol design subprogram lets you create your own special symbols or characters and use them in your two-dimensional graphic displays.

The three-dimensional portion of *EnerGraphics* can create complex drawings that are really eye-catching. You can zoom in on drawings, rotate them, and create multiple views of figures.

EnerGraphics is designed to run on an



IBM PC or PC compatible with a color graphics video board. PC video cards from vendors such as Quadram and Tecmar will work with *EnerGraphics*, but you should check with your dealer or with Enertronics to be sure that your non-IBM video card will run with the program. *EnerGraphics* can be run from the hard disk of an XT.

The Menu, Please

EnerGraphics is a menu-driven program. Selections from its main menu send you off to the five major submenus, and you use the function keys to make menu selections throughout the program. You create pie, bar, and line charts with one portion of the program; flat line drawings, such as schematic diagrams and blueprints, fall under another section that allows you to design and store special symbols to use in your drawings. The programs that create three-dimensional surfaces and objects are grouped under another main menu selection, and support programs and utilities are grouped in two other menu areas. The menus clearly display your choices, and you can move between menu areas quickly.

The section of the program that creates pie and bar charts is the easiest to use and probably the most valuable for general business applications. The program practically takes you by the hand and leads you through a series of questions about the charts you want to create. You only have to enter the numeric data and labels once. When the information is in the program,

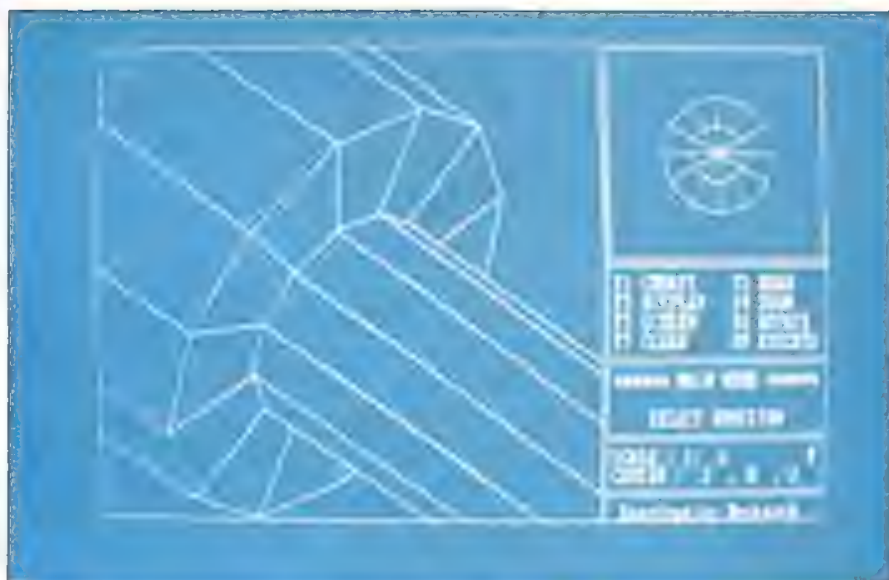
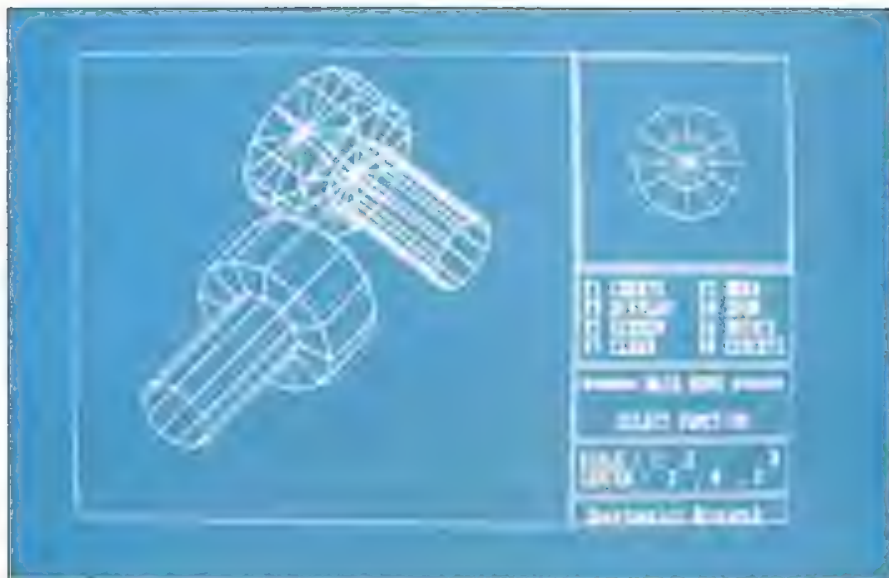
EnerGraphics

Enertronics Research, Inc.
150 N. Meramec, Ste. 207
St. Louis, MO 63125
(314) 725-5566

List Price: \$250; with plotter option, \$350; demonstration diskette, \$15.

Requires: 128K RAM, two double-sided disk drives, Color/Graphics adapter, dot matrix printer with Grafrax.

CIRCLE 734 ON READER SERVICE CARD

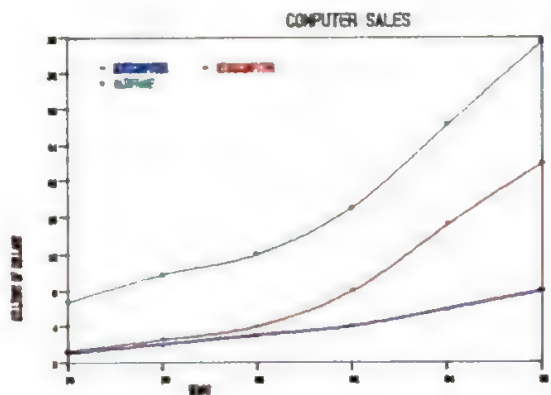
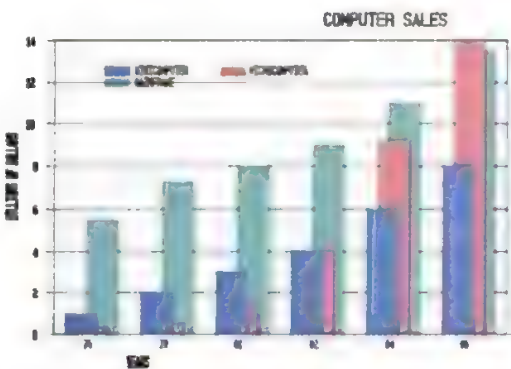
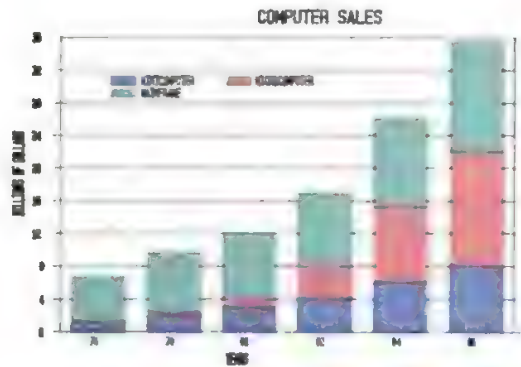
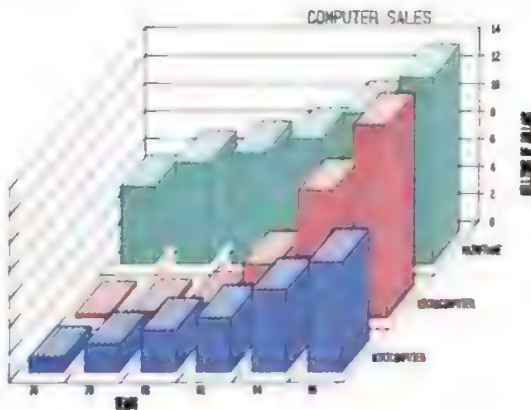


The three-dimensional drawing capability of *EnerGraphics* lets you rotate and zoom in on figures in your drawings. But drawing three-dimensional images requires advance planning. You have to think of boundaries in terms of three-dimensional space, and in addition to the x (horizontal) and y (vertical) axes, you have a new dimension to worry about: z.

you can select the kind of two- or three-dimensional presentation that is the most effective for you. Some kinds of charts can display more information than others; you can't expect a pie chart to carry all the information you can show on a stacked bar chart.

EnerGraphics can divide pie charts into a maximum of 15 slices and offset all

the slices or any combination from the pie. You can label each slice so it adopts one of four colors in a palette. There are three palettes to choose from, but you don't choose the colors until you reproduce the chart. A minor drawback in the chart construction menu is that you can't tell which colors you are actually choosing. Certain colors have psychological meanings, and I



always seem to end up with charts showing the good sections of my data in red or yellow instead of the more positive green or white. I finally made a small paper "crib sheet" telling me that color selection 2 under palette 2 is magenta, and so forth.

Two-dimensional bar charts can convey a great deal of information. You can stack the bars to show contrasts between the parts of a category or line them up side by side to emphasize the differences among categories. Three-dimensional bar charts are modernistic and striking, and they can show some relationships better than flat charts, but they can't carry as much total information as a stacked two-dimensional bar chart. *EnerGraphics* lets you switch among the stacked, side by



The data required to make these charts was entered into the *EnerGraphics* program only once. The program lets you switch easily between line, pie, flat bar, stacked bar, and three-dimensional bar charts. Each kind of chart can be created on the screen in seconds for your review before it is reproduced on a printer or plotter, so it's easy enough to create one of each kind and then decide which is the most effective for your purposes.



side, and three-dimensional modes to see which you like best.

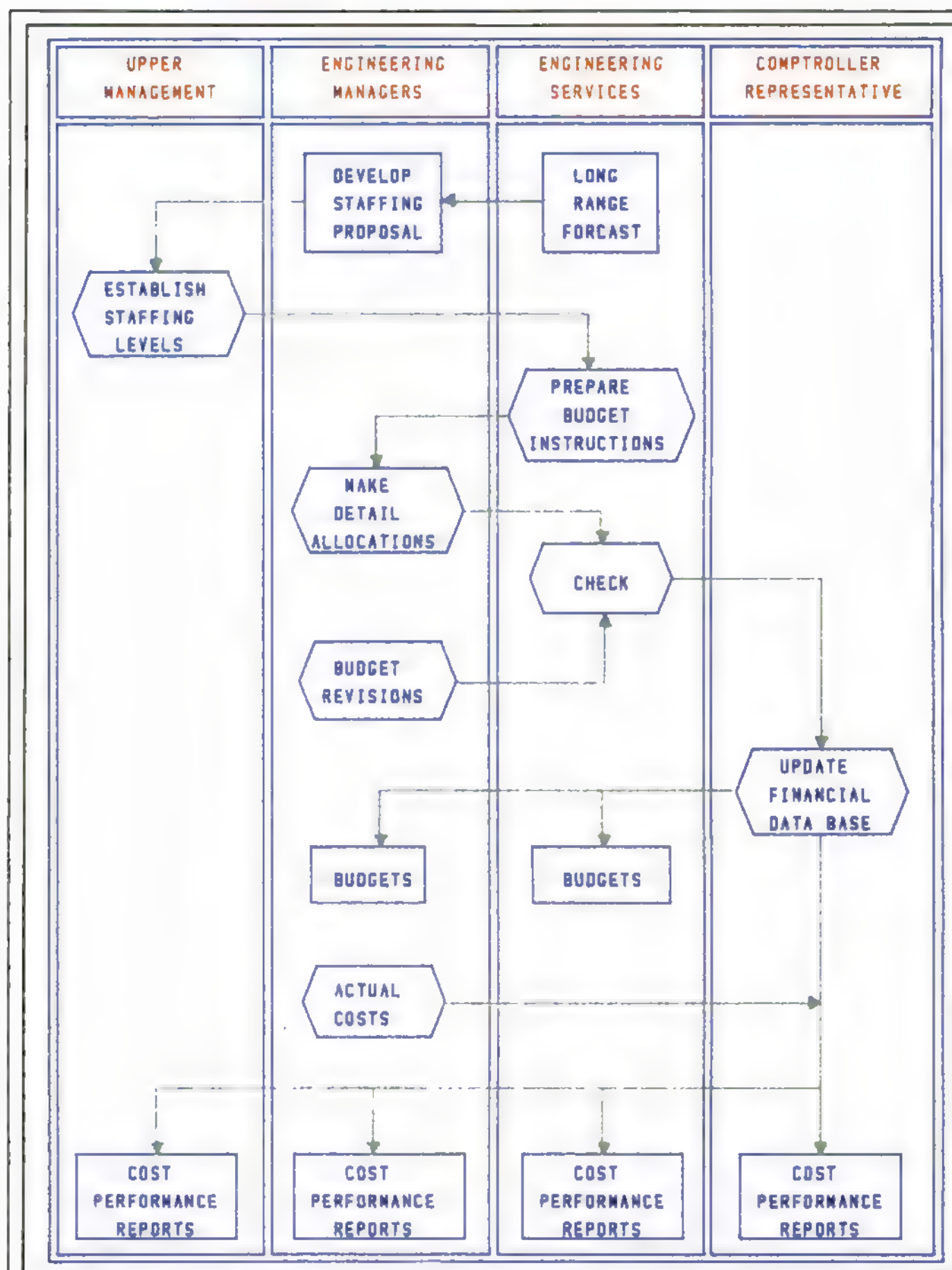
Beginners' Luck

EnerGraphics is designed so that users without any previous experience on a computer can learn to produce fine charts in less than an hour if—and this is important—they understand their data and the charts. If you have to teach them about bar charts and graphics presentations, don't count that training time against the program. But computer novices who understand the types of charts, whether produced by a draftsman or a computer, need only a short time to learn the program and the results are gratifying.

Since Lotus' *1-2-3* program is so popular, it might be useful to contrast its chart preparation capabilities with *EnerGraphics*. There are two major differences between the programs. First, with *EnerGraphics* you have to enter the numbers you want the program to use; with *1-2-3* you can simply run the cursor over them in a spreadsheet. If your numbers aren't in a spreadsheet, this difference in ease of entry disappears. The second major difference is that the present version of *1-2-3* cannot create three-dimensional bar charts. In other areas of comparison, *1-2-3* gives you a selection of fonts to use in preparing titles and *EnerGraphics* does not, but *EnerGraphics* allows you greater freedom to place titles where you want them on charts. *EnerGraphics* contains an editing routine that lets you make significant changes in your charts, but with *1-2-3* you can quickly change a chart by changing a number in the spreadsheet and re-computing.

The bottom line is that either program will do a good job of creating pie and bar charts, but both have other capabilities that can increase their value to you.

While business people need charts and graphs most, line drawings and diagrams can also carry a lot of information to those receiving their presentations. *EnerGraphics*' symbol generation function, an important part of the program, allows you to



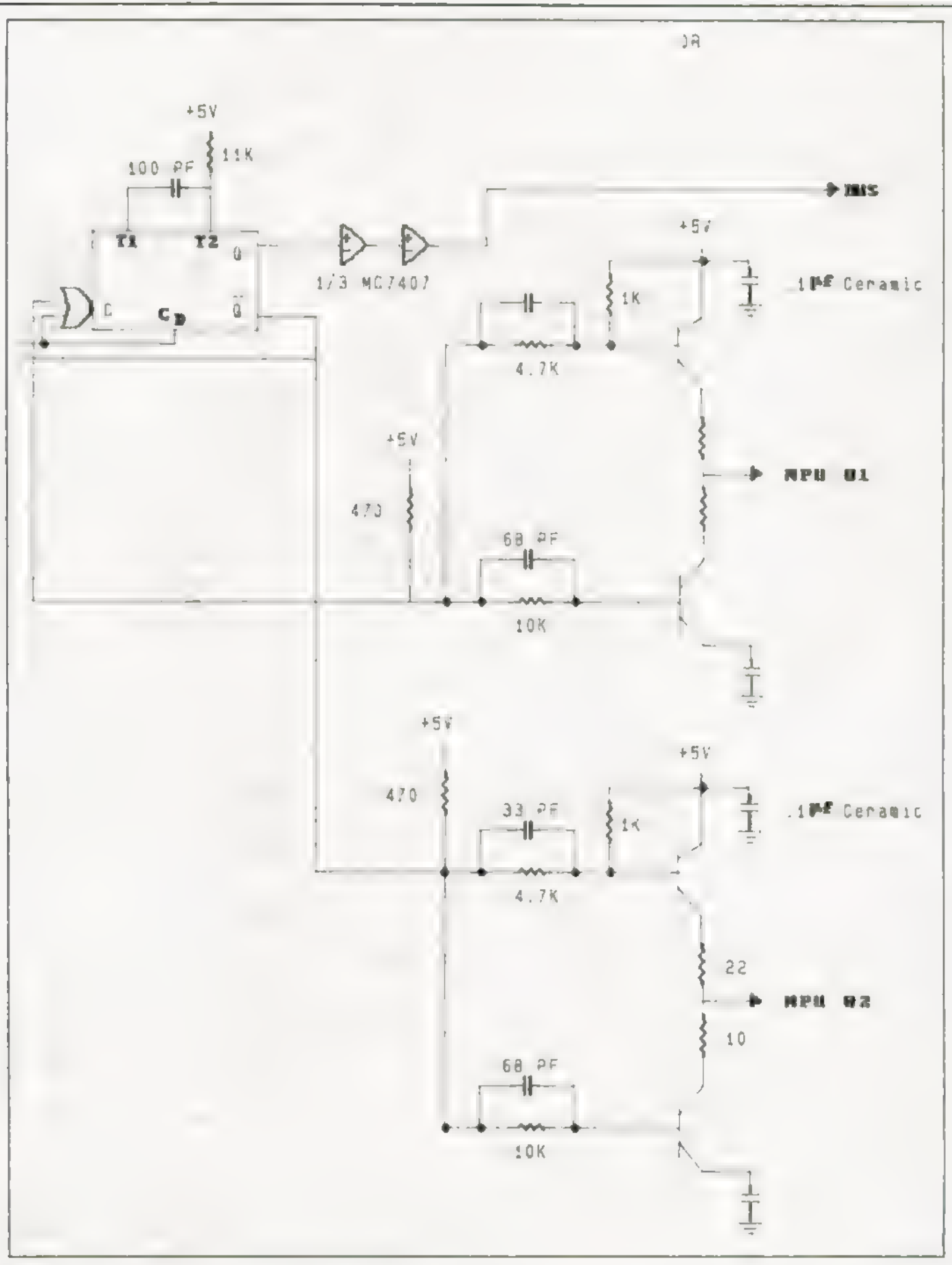
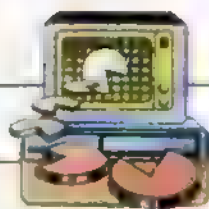
The line drawing capability of *EnerGraphics* can be used to create many different kinds of diagrams. Symbols such as those used in the electronic schematic diagram can be stored in a separate template file, called *ln*, and rotated or positioned as needed. If you need to create a drawing in separate layers, as architects and contractors often do, *EnerGraphics* will let you create layers.

create 30 templates with 38 figures in each. You can create, change, and delete figures in the templates through the menu. These figures might be the schematic diagram symbols for resistors, capacitors, and other electronic components if you are an electrical engineer; symbols for doors, windows, and plumbing if you are an

architect; or symbols for blockers and ball carriers if you are a football coach.

Digitized Lines

You create the lines in your drawing with the arrow keys on the PC's keyboard or by using a special device called a digitizer. With a digitizer board you can man-



ually enter into the computer critical points that you trace from an existing picture or drawing. Entering a drawing with a digitizer can be slow and tedious work, but in the end you have a computerized presentation that can be changed in many ways and reproduced many times.

As you draw the lines, you can call in figures or symbols from the templates you have previously created. You can place these figures on the screen, rotate them, and drag them across the screen to fit into your drawing.

Unfortunately, this action sometimes falls apart. The PC has certain limitations in its graphic memory storage that make it difficult to move figures around too much. If you rotate a figure several times in succession, it may dissolve into a series of disjointed lines. If you drag a figure across the screen, you may erase other lines as they touch your figure or you may leave pieces of your figure behind. This limitation probably has more to do with the hardware than the software, but with a little experience you will learn to avoid con-

structing diagrams that will fall apart.

Even with these limitations, *EnerGraphics* can make line drawings that are close to those created with the best dedicated drawing programs available for the PC. *EnerGraphics* lacks some features that might be found in a true CAD package, but it costs less and includes business graphics, too. One limitation of *EnerGraphics* is that it can only scroll your work vertically, so you cannot create an extra-wide drawing. In comparison, *CADplan*, a highly rated drawing program for the PC, is easier to use and can program large drawings, but costs nearly four times as much. (See "A Day in the Life of CADplan," *PC*, Volume 3 Number 7.)

The ability to divide an architectural drawing into layers is important. Architects and contractors generally use one layer for plumbing, another for electrical wiring, and so on. *EnerGraphics* lets you create separate layers and then show them together on the screen or combine them into a drawing, but it does not allow you to

If you rotate a figure several times in succession, it may dissolve into a series of disjointed lines.

display the plumbing layer on the screen while you are working on the wiring layer. Professional CAD programs do let you work on a layer while others are displayed. *EnerGraphics* also cannot automatically compute area or enter dimensions on the drawing for you as most CAD programs can.

The Third Dimension

When you create a bar chart you only have to worry about two dimensions: the x or horizontal axis and the y or vertical axis. If you create three-dimensional drawings, you have to worry about three axes: x, y, and a new dimension called z.



Furthermore, even the familiar x and y axes don't have to form the usual 90-degree angle; they can be tilted instead. Drawing three-dimensional images consequently requires a great deal of planning. You not only have to be concerned with dimensions but also with a number of different angles that interact with the dimensions. You have to think of boundaries in terms of three-dimensional space.

The *EnerGraphics* menu helps you to structure your thinking but not to visualize your subject. If you want to build a three-dimensional diagram of an undulating surface, you have to answer a long series of questions describing the upper and lower boundaries of every axis, the scale of every axis, and the labels you want to use. If you want to draw a complete three-dimensional object, you also have to consider whether or not the segments of the object overlap and how the segments (known as planes to those who dabble in

the subject) are oriented in the drawing.

The three-dimensional drawing menu contains commands that give you flexibility in creating figures. A command called ROTATE takes something as simple as a flat rectangle and rotates it around a circu-

The menu helps you
to structure your
thinking but not to
visualize your
subject.

lar volume. This is like drawing a square on the side of a tin can, for example, and then rotating the can around on a stick punched through both ends. But the computer will allow you to see all the sides of the square as the can rotates. This capability is useful for simulating the views you

would see if an object were drawn from different angles. A command called CALC helps you to figure the correct dimensions and angles to use so the segment will meet itself after one full circle of rotation.

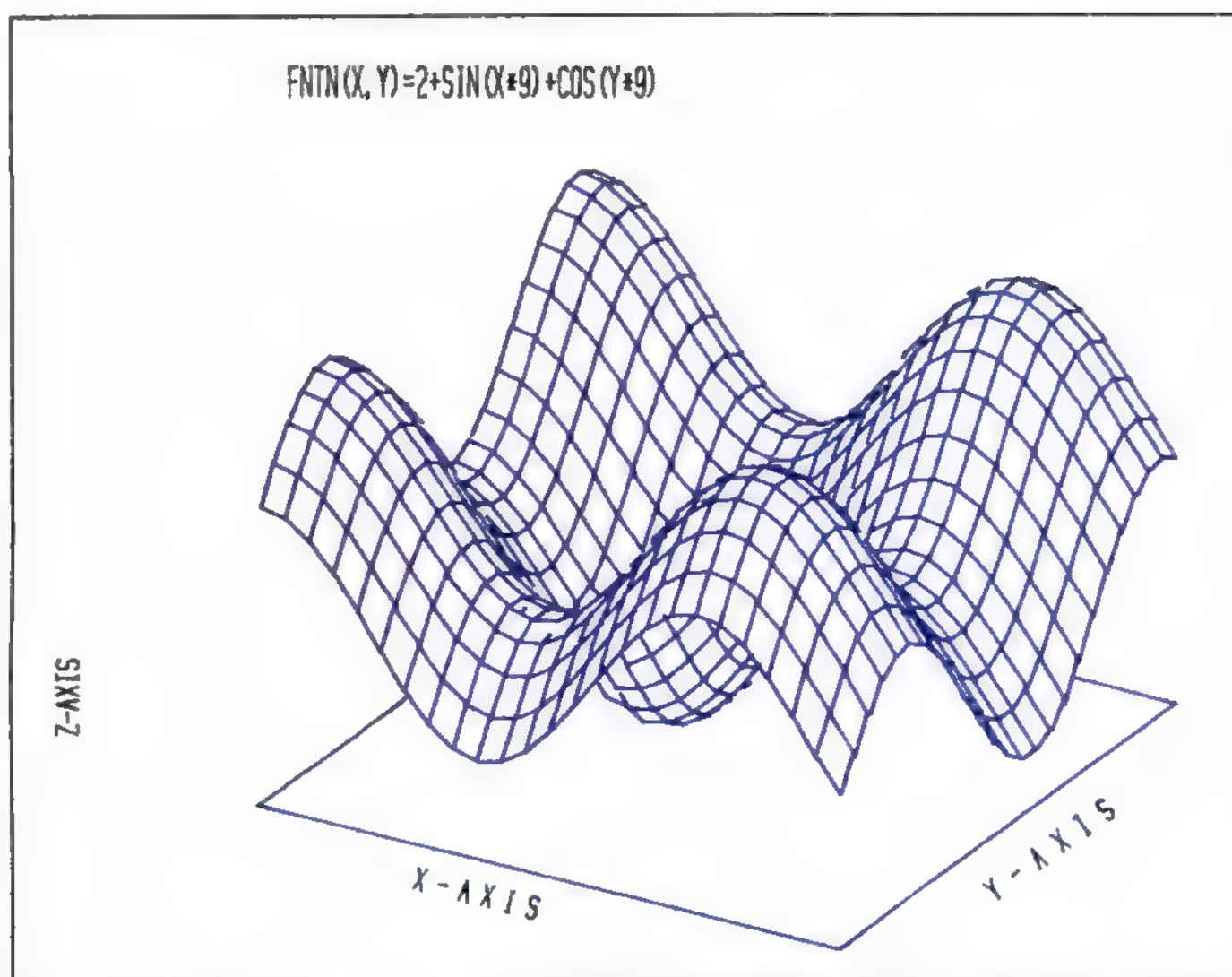
You need to know a great deal about the common practices used in the creation of these figures before you start. If you have taken a course in orthographic projection and understand terms such as "hidden object line" and the "orientation of planes," you'll have a good start.

If you are familiar with the use of modern graphics systems to display data sampled from scientific experiments, you will appreciate the special Input Function command built into *EnerGraphics*. This feature allows you to create complex formulas that you can store and apply to numbers you put into the system at any time. The resulting three-dimensional line charts and surface drawings can graphically display very complex relationships between the numbers and give you a visual picture of how changes in an experiment change the data. If you figure out calculus problems as part of your job, you will be able to put this function to good use.

Trading Data

The data interchange format (DIF) file structure is a standard method of creating files that can be shared between programs. Many popular programs such as *dBASE II* and *1-2-3* can read and write DIF files. *EnerGraphics* contains a utility program that will read DIF files and convert them to the data files it uses to make pie, bar, and line charts. This transfer and creation takes several steps so it probably isn't practical for just three or four charts, but if you are making a dozen monthly charts from a single *VisiCalc* spreadsheet, it would be worthwhile to create a DIF file with *VisiCalc* and read it into *EnerGraphics*.

You can see the results of your charting and drawing either on the screen or in printed form. If you choose to see your pictures only on the screen, *EnerGraphics* can put a series of stored graphics images



This three-dimensional surface drawing was created by the program in response to the formula shown above the figure. As the values of X and Y change, the figure is quickly changed. To create such a figure you have to be concerned not only with dimensions but also with a number of different angles that interact with the dimensions. The *EnerGraphics* menu helps you by leading you through a long series of questions about the boundaries, axes, and labels you plan to use.

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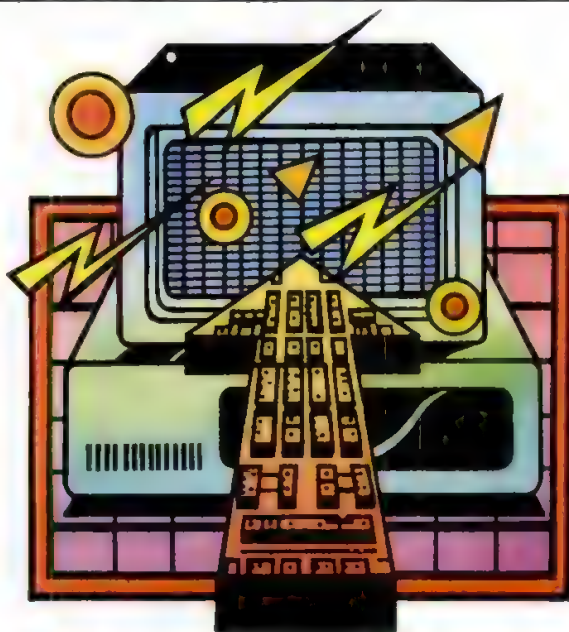
together in the form of a slide show. This electronic slide show can be very effective at a presentation if you bring a large enough video display.

If you want to see your charts and drawings on paper, or on acetate overhead projections, there are several ways to reproduce them. The standard \$250 version of *EnerGraphics* will send your drawings to various dot matrix printers. I haven't tested *EnerGraphics* with any of the new ink jet printers such as the Quadjet from Quadram. These new devices are an excellent way of producing colored charts and overhead projection charts very quickly, but you have to figure out how to make the software send the needed instructions to the printer. A \$100 Enertronics plotter option will let you reproduce your charts on Hewlett-Packard and Houston Instrument plotters.

The *EnerGraphics* manual is a big help in using the program. It covers each major program area and gives a short tutorial in each section with background on the fundamentals of charts, line drawings, and three-dimensional drawings. The manual includes many illustrations and an index, but no glossary.

Who should buy *EnerGraphics*? First, anyone who makes presentations in a school, government office, or business would find this program useful. I frequently use *EnerGraphics* to create charts and find it practical for both small and large jobs. Once you get the numbers into the program, it works faster than you can say its name.

The chart and graph subprograms are useful for almost anyone in business, education, or government, but the drawing programs have more limited applications. If you are creating a drawing that you'll use only once, you might still consider using the old drawing board, T-square, and triangles. The limitations on size and the preplanning needed to create a good electronic image aren't worth the effort. But if you plan to reuse a drawing or modify it, then creating it with *EnerGraphics* is a practical course of action. ■



Graphix Plus A Whole Lot More

When it comes to graphics adapters, PC compatibility is not enough. STB's offering performs all the basics plus two minor miracles: monochrome graphics and flicker-free scrolling.

Evaluating a color/graphics adapter board for the PC is apparently straightforward—plug it in and see if anything recognizable appears on the monitor. If the display looks normal, the hardware critic yawns and the board gets a favorable review. If it doesn't the critic pulls out his hatchet and reaches for his book of barbs.

Break out the No-Doz. I'm watching

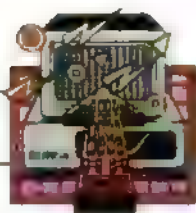
the work of the STB Graphix Plus right now. Every time I press a key, letters magically appear on the screen. The STB Graphix Plus easily passes its screen test.

Equal Is Not Enough

But no graphics adapter strives merely to meet such a minimal test of IBM compatibility. All offer something more than

an imitation of the factory-authorized performance, and with good reason. It's a tough job to compete with IBM. The \$244 Big Blue now demands for a color adapter and the \$335 for a monochrome display/primer adapter are downright bargains compared to the price tags some peripheral suppliers hang on their products. The list price of the Graphix Plus is \$495.

Peripheral suppliers such as STB know



that to win in the marketplace they've got to offer additional features, greater performance and extra convenience. The STB Graphix Plus is designed to beat both IBM display adapters on all counts. Beyond merely making color graphics like the ones from an IBM color card, the Graphix Plus adds a parallel printer port. Beyond just duplicating the function of IBM's monochrome card, connecting IBM's unusual monochrome display to your PC, the Graphix Plus can put graphics on your monochrome monitor.

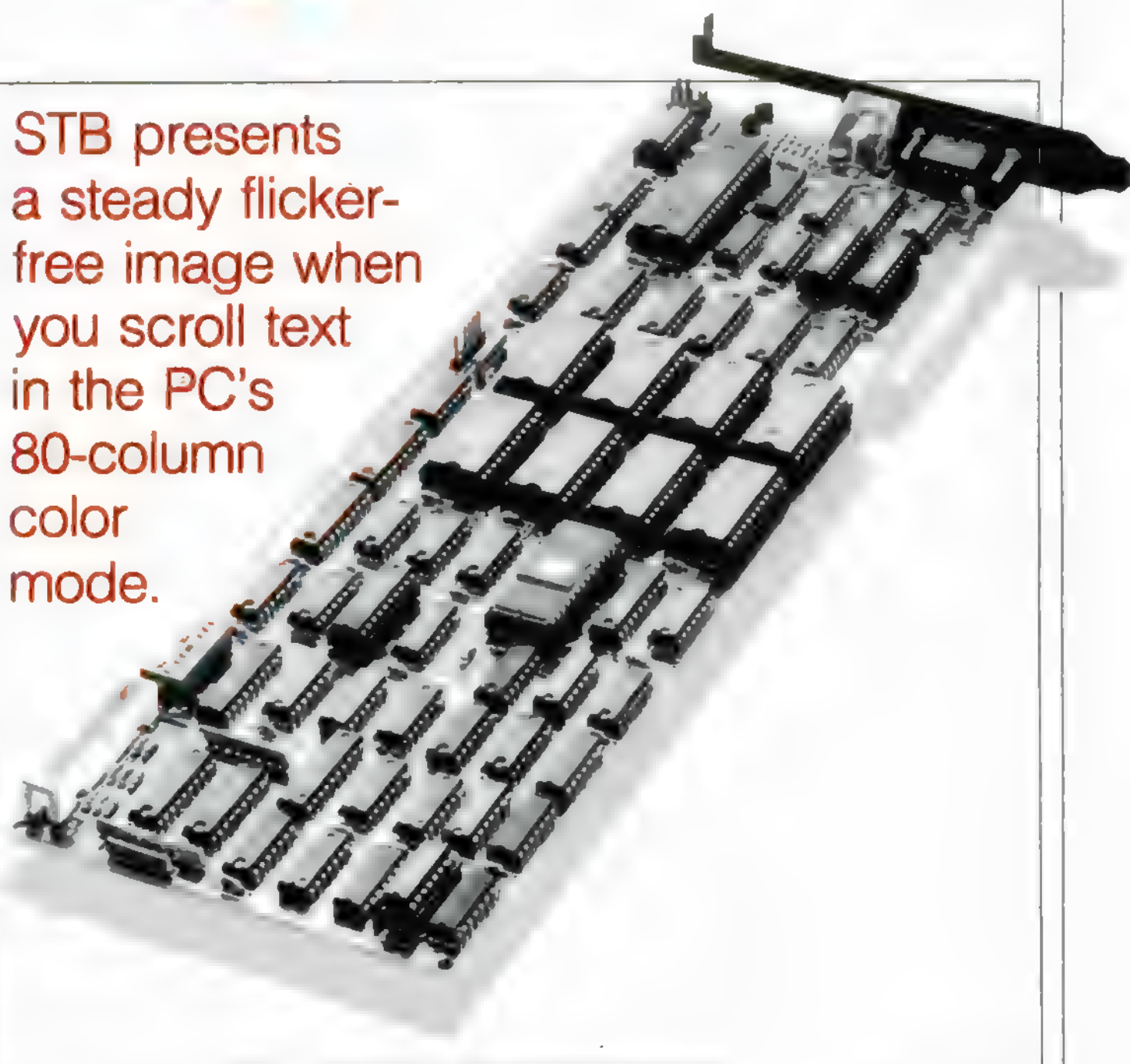
The STB Graphix Plus printer port outdoes the standard IBM port and those of many peripheral suppliers: It works as a two-way street, receiving as well as sending data at the mere flick of a DIP switch. You can use it to connect a hard disk subsystem to your PC. You can also add an optional clock with battery backup if you dislike setting the time every time you turn your machine on.

STB outdoes IBM on performance and features. The Graphix Plus runs circles around the IBM color card—it's 50 percent faster—and does one thing that IBM seems unable to manage with a color display: It presents a steady, flicker-free image when you scroll text in the PC's 80-column color mode.

If that's not enough, the software packed with the Graphix Plus earns a big gold star on its own. Not only does STB give you the bonus programs supplied with most peripheral boards—a RAMdisk and a print spooler—it goes the standard software more than one better.

The RAMdisks—that's right, you can have two of them—act for all intents and purposes like genuine disks. You can even put the operating system on them and reassign them so you no longer have to keep a

STB presents
a steady flicker-
free image when
you scroll text
in the PC's
80-column
color
mode.



The Graphix Plus adapter board from STB Systems.

“system” disk in drive A. This scheme avoids the nuisance of message and system disk shuffling every time you exit from a program. You can even format the virtual disks to run under CP/M-86. Further, if you give your machine the boot—press the famous Ctrl-Alt-Del combination—your RAMdisks and all the data you've stuffed onto them survive! I've never encountered RAMdisks like these before.

There's more. The data in the printer spooler survives a warm boot. New direct printer commands are added to your keyboard. You can even pause a program by pressing just one key.

Intrigued? I was. But does it really do all it claims?

Handling the Hardware

As you might expect, the Graphix Plus uses essentially the same set of integrated circuits as any display adapter, color or

monochrome, that claims IBM compatibility. If you've seen one IBM video board, you've seen them all.

The workmanship is essentially workmanlike. The Graphix Plus meets the same high standard of quality construction that people have come to expect and demand from IBM.

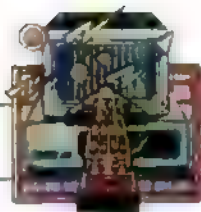
Like any peripheral board designed with an assortment of optional functions, the Graphix Plus bears a row of DIP switches on its back. One switch allows you to configure the board to drive either an IBM color monitor (or compatible), an IBM monochrome monitor (or compatible), or any composite input monitor. Another controls how the Graphix Plus describes itself to your computer: as a color/graphics adapter or as a monochrome adapter. One switch can change the parallel port from an IBM-compatible printer port into a Shugart Associates Standard Interface (SASI) compatible two-way port

Graphix Plus

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Richardson, TX 75081
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capable of handling a hard disk. (Adding an additional drive isn't quite that simple, however. You can't just plug the Graphix Plus into a disk drive—you also need a disk drive controller and software to make it work.)

The Graphix Plus card itself will happily reside in any expansion slot inside your PC. Because it requires a full length expansion slot, it will not fit into either of the two short slots of the XT.

Once you've installed the board, two connectors will protrude from the back of your PC—a standard 9-pin monitor connector and an RCA pin jack suitable for a composite monitor.

The parallel port is less convenient. An 18-inch ribbon cable (included with the Graphix Plus) plugs into a header (a row of gold-plated pins) on the Graphix Plus card and trails out through the back of your PC, ending in a standard IBM (female DB-25) parallel printer connector.

STB supplies the hardware and an appropriate piece of sheet metal so you can mount the connector behind a vacant expansion slot. If you're like nearly every other PC user in the world and have no extra slot space, you can route the cable through a gaping hole in the Graphix Plus' black metal slot adapter. Although the arrangement looks unimpressive, it's typical.

Although I could not test the optional clock with battery backup (I didn't get one), its design earns both high and low marks. It deserves praise for using a standard AA battery—no more searching the countryside for some obscure battery size that's used only in electronic steam-whistle regulators. But its off-card mounting scheme would earn the envy of Mickey Mouse—a penny's worth of plain double-sticky tape to lay wherever you can find room, permanently gunking up your \$3,000 to \$5,000 investment.

A Colorful Turn-On

Installing the hardware is a snap. Match up the DIP switch settings to the ones in the manual, power on, and you're

on your way. If making pictures is your only goal, you needn't bother reading the rest of the stapled photocopied sheets. If you know enough to turn the power on and know the kind of monitor you have, you can't go wrong.

The instructions packed with the

Match up the DIP
switch settings to
the ones in the
manual, power on,
and you're on your
way.

Graphix Plus were labeled "preliminary." I hope the permanent version will contain more information and will be better written. You'll find only the barest essentials on the parallel port (its addresses cannot be reassigned to prevent conflicts with other peripherals) and only a brief mention of the light-pen connections.

When you power up, you'll be hard pressed to see any difference on your screen between the genuine IBM product and the STB enhancement. An STB ad claims that the Graphix Plus produces the same colors as the IBM adapter, but that claim is meaningless. You should automatically expect to get the same colors; with an RGB monitor, the hues that you see are determined by the monitor and software, not the adapter.

If you use a composite color monitor (a monitor that uses a cable with RCA phono plugs at either end to connect it up), the colors will definitely be different from those you get with the IBM product, because the Graphix Plus does not have composite color capabilities. Your composite picture will be in black, white, and all the grays in between.

Non-IBM monochrome monitors with composite video inputs can be used only in color-compatible mode. This means you'll see multiple gray levels or textures (instead of two, standard and highlighted).

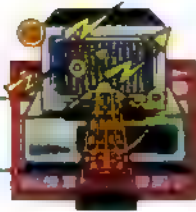
You'll also see the IBM color character set, which is formed in an 8-by-8 dot matrix and makes sorting through single-spaced text about as pleasurable as peeling individual anchovies from a tin. This is because the Graphix Plus cannot put the high-resolution IBM monochrome character set on a composite monochrome monitor. The monochrome character set requires more lines than most composite monitors have and requires that monitors operate at nonstandard horizontal and vertical frequencies.

With an RGB monitor, your greatest pleasure in using the Graphix Plus will be its high-speed inner workings. STB engineers accomplished what appears to be beyond the capabilities of the crew at IBM: As promised, there is no flicker when the screen scrolls. Moreover, the screen keeps up with program processing. In *WordStar*, if you hold down the scroll button (Ctrl-Z) the screen will scroll and when you release the button it will stop. When the scrolling switches to high speed with other, slower display adapters, lines randomly disappear from the text as it whizzes by, and the screen takes several seconds to recover once you finally let go of the keys. This *is*, admittedly, just a small convenience, but nonetheless I'll fight with anyone who tries to pry the board out of my PC.

A Monochrome Miracle

The Graphix Plus performs its biggest miracle in monochrome mode. Well, not exactly monochrome—as you'll see. First, you set one of the DIP switches to tell your PC you have a color monitor, and you set two more to tell the Graphix Plus your monitor is monochrome. When you install a program for your newly configured system, you advise the program that you are using a color/graphics adapter and a black-and-white monitor. Finally, you must add a new command to your AUTOEXEC.BAT file.

If you fail to add the special installation line to your AUTOEXEC.BAT file, the screen of your IBM monochrome monitor



will display an unstable, misshapen image that will probably settle down after a while. No big deal—just be sure to use the STB program.

But here's something that the clever designers at STB haven't considered. If, when you purchase your brand new IBM PC with an IBM monochrome monitor, you choose the Graphix Plus in lieu of an IBM monochrome adapter, you are preordained to have problems. You have to install the STB program before the monitor will work properly. Before you have even a little experience with your new computer, you will be confronted by a fearsome display daring you to tame it. Better get your dealer to make a boot disk for you with the Graphix Plus installation already done.

After all that confusion, all you'll see on your monitor at first is the normal high-resolution monochrome character set. When you slip your programs into graphics mode, however, something wonderful happens. The display pauses for a moment as the Graphix Plus collects its thoughts, and then the seemingly impossible happens: genuine graphics appear on your IBM monochrome display!

Alas, your new monochrome graphics will look like someone sat on them. They're rather squashed down, roughly half as high as they should be. The reason is simple: IBM graphics use 200 lines on the display, which is convenient since with most IBM-compatible graphics adapters, monitors show 200 lines. But because the higher frequency, higher resolution IBM monochrome monitor paints itself with 350 lines, the 200 lines of graphics fill only little more than half the screen. (The Graphix Plus vertically centers these 200 active lines.) The solution? As you may already have figured out, when the Graphix Plus switches to its monochrome graphics mode, it uses the low-resolution IBM color character set.

STB has conquered one form of monochrome malfeasance: application program graphics that disappear in a sea of green. On a color monitor, a blue background

with a white figure looks fine. But in the graphics mode, an IBM monochrome monitor attached to the Graphix Plus interprets all colors as green. Instead of graphics you would see a brightly lit green screen with no discernible drawing. Three extra DIP switches on the Graphix Plus

PC Accelerator lets you define two RAMdisks that are more like disks than any I've ever encountered.

permit you to control how colors will be interpreted into monochrome to avoid such problems.

Super-Duper Software

One of the traditions among peripheral manufacturers is to include a disk of program utilities with their hardware products—sort of a bonus disk. It's *de rigeur* to get a print spooler and a disk emulator (a program that ropes off a chunk of your computer's working memory and makes the machine think it has a super high-speed disk drive). STB follows the tradition by distributing a program called *PC Accelerator* with the Graphix Plus. *PC Accelerator* lets you define two RAMdisks (only one in the PC-DOS 1.1 version) that are more like disks than any I've ever encountered. You can use any standard PC-DOS disk command on them—the CHKDSK command even reports any memory less than a standard disk size as a "bad sector"—or even format them in about half a second.

The greatest virtue of these RAMdisks is their invulnerability to a warm boot (although not to turning your computer off and back on). Do an ordinary Ctrl-Alt-Del reset, and everything you put on both RAMdisks is still there. You can even do a warm boot from either of the RAMdisks (by pressing down one of the Shift keys in

addition to the normal threesome).

I found that I could put PC-DOS on one RAMdisk and CP/M-86 on the other and boot either operating system from the RAMdisk whenever I wanted to—in less than a second! Although the PC-DOS disk stayed DOS during the transition and the CP/M disk stayed CP/M, the data stored in the PC-DOS disk was not readable when CP/M was at bat, and vice versa.

The print spooler, too, survives a warm boot and even an operating system switch. Although STB won't guarantee it, the flimsy instruction manual hints that you can load the spooler, boot a video game, and play while printing. I tried it and played *Digger* while my Qume churned out page after page of manuscript.

But don't fall into a trap. No spooler loads instantly, and dumping a tens-of-thousands-of-bytes-long document can take a good while, especially when a printer driver is hard at work inside a word processor like *WordStar*. If you reboot before the "printing" message clears from the screen, the tail of your document will be lost. The problem is not the spooler itself—it will keep pumping out characters until it's empty—but that your entire document wasn't loaded into the spooler before you booted your words to never-never land.

Other utilities included with *PC Accelerator* allow you to use the asterisk (*) on the PrtSc key as a one-key substitute for the Ctrl-NumLock combination to halt a program. The key press stops execution only in programs with which Ctrl-NumLock works (programs written in BASIC, for example, but not in most applications programs).

PC Accelerator also adds a few new commands to the keyboard: instant form feed, printer initiation, print pause, and clear the spooler. To activate any of these functions you hold Alt, strike PrtSc, then strike one or two further keys.

PC-DOS 1.1 users will welcome another utility that can add some PC-DOS 2.0-like features to their computer's repertoire: *PC Accelerator* includes an Assign



function to switch disk drive letters or printer assignments and a status report that gives a memory assignment and availability rundown.

The preliminary instructions also promise temporary blanking of the screen. This can be handy when you're taking a break and you don't want to etch the screen with your text but you don't want to turn the monitor off either, but this feature never worked for me.

For DOS 1.1 compatibility, *PC Accelerator* is put into operation through your AUTOEXEC.BAT file rather than through the CONFIG.SYS file that those experienced with DOS 2.0 might expect. (*PC Accelerator* also runs fine under the PCjr's DOS 2.1 too I discovered.) An installation program makes creating the proper file or altering the one you already use as easy as answering simple questions about what you want.

Once your PC loads *PC Accelerator*, it automatically reboots itself and heads back through the AUTOEXEC file again. Fortunately, it will remember the territory and won't lock itself into an endless loop. Under DOS 2.0 or 2.1, your PC will run through your CONFIG.SYS file (if you have one) twice, initiating any devices defined therein twice as well. It won't hurt anything, but the second time around does take a few extra seconds.

I found *PC Accelerator* a congenial program. I have a non-IBM hard-disk system and use a RAMdisk that initiates through the CONFIG.SYS file. When I ran *PC Accelerator*, all my normal functions worked along with its additions. I had two floppies, drives A and B; two *PC Accelerator* RAMdisks, C and D; a hard disk, E; and another RAMdisk, F—more than I could deal with.

PC Accelerator promises to shorten the turn-on time of a PC, but this is one feature I couldn't find. The manual claims that the program allows a quick start—that an 896K computer will be ready to run in 35 seconds. However, I noted no new speed at turn-on time with my more modest system. Perhaps this feature works only with

STB's other hardware products.

Reviewing software often seems very similar to entomology—invariably you end up discovering new and strange bugs. I found one with the RAMdisks—when I'd ask *WordStar* to "change logged disk" from one RAMdisk to the other, the pro-

For your extra
dollars you get a
parallel port, faster
display, and
monochrome
graphics, but you
lose composite color
ability.

gram would go through the motions and revise the listing of the drive it was using but would *not* update the directory. I would switch from C to D; *WordStar* would tell me I was on D but give me the directory from C. The only way I could get to the D directory was by reloading *WordStar* from scratch.

The Bottom Line

Choosing among the hordes of display adapter boards for the PC is not easy. The difference between the STB and IBM adapters is not quality; both conform to extremely high standards. Your concern should be matching features to what you want and need.

The Graphix Plus costs roughly twice as much as an IBM Color/Graphics adapter and \$160 more than an IBM Monochrome Display/Printer adapter. For your extra dollars you get a parallel port, faster display, and monochrome graphics, but you lose composite color ability. You also have the option of adding a clock/calendar and light pen, and you get the *PC Accelerator* software. You must decide for yourself whether the added benefits are worth the extra price. ■

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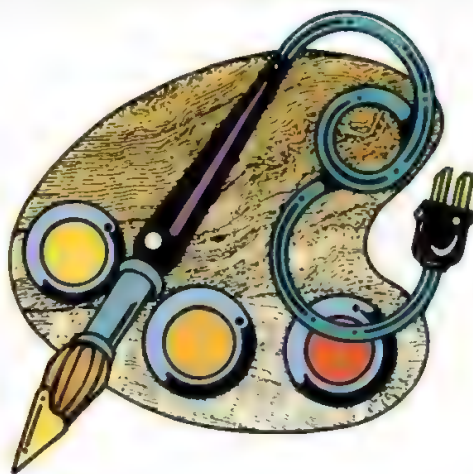
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APPLICATIONS/BARRY WALDMAN



Computer Graphics From The Launching Pad

The computer graphics produced at the Launching Pad, Barry Waldman's studio, are both sophisticated and homemade.





Alvin Toffler and other seers who have predicted the emergence of "electronic cottages" envision people working at their computers at home and transmitting data instead of transporting themselves to a central workplace. Well, in my business, at least, the predictions have already begun to come true. I'm a graphics designer and I work out of my "electronic apartment/office in the sky" on the 21st floor of a Manhattan apartment building.

Launching Pad, my studio, has clients as far away as Chicago and New Orleans and I have production work done in China, Italy, and France. I produce a wide variety of drawings, sketches, paintings, and mechanicals, ranging from initial concept submissions to finished art, without leaving my building. I work on ads, packaging, brochures, audiovisual material, story boards, product design, sales literature, and promotional campaigns. Recently, computers have become an important part of my work setup for these projects.

In March of 1983, I decided to make a modest investment in a machine with reasonably powerful design capabilities. I could have spent \$10 million on a Cray computer and gotten everything that I wanted, but reality reared its ugly head and persuaded me to spend my limited amount of money on a smaller system—an IBM PC with 128K RAM, two double-sided disk drives, an IBM monochrome and a Quadchrome color monitor, a game board, a Brother HR-1 daisy wheel printer, and, finally, an IDS Prism (now called the Data Products P-Series) #132 dot matrix printer.

The Software

Over the next few months, I added several graphics software packages, including *Lenipen* and *Lenitext*, *VersaWriter*, *EnerGraphics*, *Rainbow Writer Screen Grabber*, and *Rainbow Writer Color Text Formatter*. The whole setup cost me about \$11,000.

It's controlled with either *Lenipen* the lightpen, included with the package, or the

Giving It All I've Got

Here's a detailed explanation of how Launching Pad's promotional poster was developed.

I constructed this poster in order to announce my ability to perform computer graphics. I wanted it to demonstrate the range of services I was offering, so it utilized virtually every piece of hardware, software, and knowledge that I possessed.

The rainbow at the top of the poster was drawn as a full screen with circle commands on the *VersaWriter* bit-pad. The colors and dithers patterns were inserted in the spaces between the arcs by executing the fill and airbrush protocols. Sizing and position instructions were inserted later using *Rainbow Writer* and *Screen Grabber*.

The checkerboard panels across the top and bottom of the poster were composed on *VersaWriter* using the keyboard line, box, and fill commands to create a set of black and white boxes. After the first portion of the checkerboard was created, the remainder was cloned from the first set using Get-Put commands. Errors in the completed checkerboard bars were then cleaned up by filling in the background colors. The checkerboard at the bottom is merely a repeat of the same graphic file as the one at the top.

The blue statement, "Launching Pad proudly announces," is the first time independent text appears on the poster. It was typed with the word processing program along with a set of color, font, size, and position protocols.

The headline, "Print Computer Graphics In House," is a *Lenitext* graphic. I filed the *Lenitext* output onto a disk and then manipulated the spacing using the *EnerGraphics* program.

The girl's head was rendered in several stages using *VersaWriter*'s Airbrush

(dithering or artifacting) commands. Using the *Rainbow Writer* and *Screen Grabber* programs, I chose the portion of the full-screen image that I wanted to output onto paper. Before printing it, I performed several variations of color combinations on scrap runs and ran many experiments with size and aspect ratio.

The text sections on the poster were typed in using a *MultiMate* word processing command document with embedded *Rainbow Writer* commands that determined size, color, and location of the various text elements.

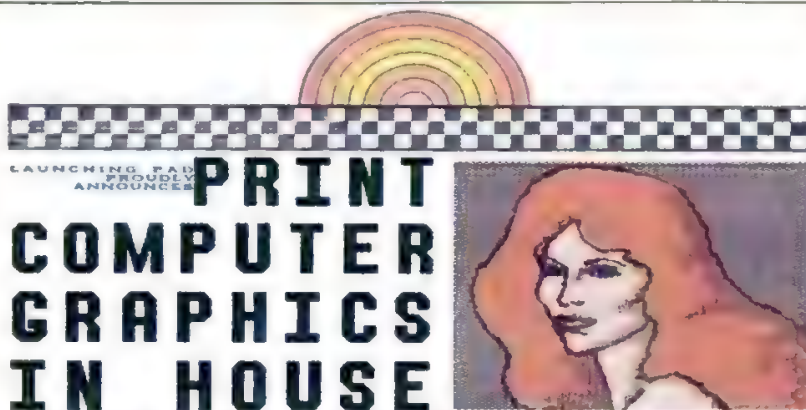
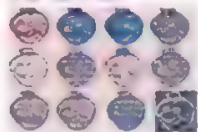
The strawberries were created using *VersaWriter*. First, the initial black-and-white line drawing was cloned, and then the color, fill, and airbrush protocols were executed to color them.

The supermarket shelves were drawn using both *Lenipen* and *EnerGraphics*. The disk file was sent back and forth between the two programs in order to use both of their capabilities. The TV sets and telephones are symbols packaged in the *Lenipen* program. I picked them up and positioned them on the shelves with *Lenipen*'s light pen.

The Launching Pad logo that adorns letterhead and promotional materials cost several hundred dollars to produce. The electronic version on the poster took just minutes using *Lenipen* on the PC. It was fun busting up the stacks of lettering to simulate the launching of the logo.

The Launching Pad phone number is freehand electronic lettering created with an "electronic brush" of dithered colors. I sketched this part of the poster using the *VersaWriter* digitizer arm on the *VersaWriter* tablet.

—B.W.

[illegible]

STATION TAKES
OUR SYSTEM CAN
BE MADE TO
DRAW ANYTHING
AND I MEAN
"CLONE" IT; WE
CAN THEN COLOR
IT ANY ONE OF
MANY
VARIATIONS (AS
SHOWN) BUT
NO CHANGE
IN POSITION OR
ROTATION
ASPECT, ETC. OTHER
UTILITIES AVAILABLE ARE TO
REVERSE THE PRINT AND SEE HOW
IT LOOKS, TO PRINT AND SEE HOW
IT LOOKS TO THE RIGHT AND SEE HOW
IT LOOKS PRINTED UPRIGHT WAS
REPRESENTED IN OUR COMPUTER BY
LISTING THE CARDS IN REVERSE
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Year	Sales (millions of dollars)
1980	1.5
1981	2.0
1982	2.5
1983	3.0
1984	3.5
1985	4.5

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keyboard. *Lenipen* lets me draw original designs directly onto the screen. While the software does not provide high resolution, it allows me to manipulate images in a variety of ways, and to output them in several formats.

Lenitext, which is accessed with *Lenipen*, contains five headline fonts that can be pulled up onto the computer screen. By using *Lenipen*, I can then modify these five and create a multitude of different fonts.

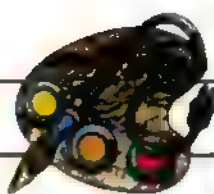
The most valuable tool in my system is *VersaWriter*. Using a writing tablet with a hinged potentiometer arm, I can make freehand drawings and take advantage of the software's 100 airbrushed colors (created by manipulating the four colors on the Quadchrome monitor).

EnerGraphics is a line-graphics program that allows me to create a library of graphics and/or letters. Using a screen grid, I use the keyboard to turn each pixel on or off, resulting in an image. The software is capable of linking nine screens into a unified graphic display.

The *Rainbow Screen Grabber* is installed in RAM as a first step in outputting several graphics and text files to the IDS Prism printer. The program creates three image buffers (each one analogous to a piece of film) in memory. Once I have a completed image, I push the Shift-PrtSC key combination and the *Screen Grabber* "takes a picture" of that image, and stores it in one of the image buffers.

The next step is to exit the graphics software that generated the images and call up the *Screen Grabber* screen. There, I can view the images, rescale them, specify sizes, rotation, and colors, and edit the pixel area desired for output to the printer. This enables me to grab a picture I created with any program, manipulate its size, shape, and color, and then put it on the page exactly where and how I want it.

At that point, I can put the edited images on disk in the *Rainbow Writer* format. When all the desired images have been grabbed, edited, and put into the *Rainbow Writer* format, I can prepare the



command document that directs *Rainbow Writer* to place the graphics and attached text anywhere on the page.

Reinventing the Wheel

I discovered that if I wrote the programs within the constraints of MS-DOS, BASIC, and file form, I could make a picture using one program, save it to disk, and then, using the capacities of other programs, change it to suit my needs. Though to more experienced computer users this may be like reinventing the wheel, to me the discovery was new and useful. For example, if one package could not do headline lettering, I would rerun the graphic through a package that did. The result is that the limited abilities of my low-cost programs complement each other and provide me with a fairly sophisticated overall design system.

Lithographic, or process printing, can produce an infinite number of colors, although in actuality only four inks are used: red (or process magenta), yellow, blue (or process cyan), and black. The inks are placed on the printed page in solid areas or combinations of dots to create the desired color.

I can create the same illusion using my printer. The process ribbon used by the printer contains the same four color stripes of ink. Thus, color combinations are produced in much the same way as those created by a lithographic printer.

When I felt ready to announce that Launching Pad offered in-house computer graphics, I decided only a big, colorful poster would have the appropriate impact (see sidebar, "Giving It All I've Got"). The poster consists of over a million dots in nearly 30 colors (some true colors, some overprinted pseudocolors, and some artifacted colors), and it was created with software and hardware I own.

Since my entry into computer graphics, important advances have occurred, and I hope to take advantage of them. For example, expensive, high-quality systems have appeared that are capable of accepting photographs, freehand art, and other

material into their memories through integrated scanners. These materials can then be electronically merged with text, headlines, and other elements. The finished product is output to a digital laser plotter,

which processes it as full-color film.

Soon, even small graphics companies and individual artists will be able to produce high-quality work using sophisticated computer technology. ■

Product Information

Listed here are names, addresses, phone numbers, and more for the software mentioned in this article.

EnerGraphics

Enertronics Research Inc.
150 N. Meramec, Suite 207
St. Louis, MO 63105
(314) 725-5566

List Price: \$350, \$100 for plotter adapter

Requires: 128K RAM, two disk drives, color/graphics adapter, RGB monitor.

CIRCLE 727 ON READER SERVICE CARD

Rainbow Writer Color Text Formatter

Application Techniques Inc.
80 Townsend St.
Pepperell, MA 01463
(617) 433-5201

List Price: \$149

Requires: 96K RAM, one disk drive, Data Products P-Series (formerly IDS Prism) printer.

CIRCLE 728 ON READER SERVICE CARD

Rainbow Writer Screen Grabber

Application Techniques Inc.
80 Townsend St.
Pepperell, MA 01463
(617) 433-5201

List Price: \$99

Requires: 96K RAM, one disk drive, color/graphics adapter, Data Products P-Series (formerly IDS Prism) printer.

CIRCLE 729 ON READER SERVICE CARD

Lenitext

Duncan-Atwell Computerized Technologies Inc.
1200 Salem Ave.
Hillside, NJ 07205
(201) 355-1690

List Price: \$395

Requires: 128K RAM, one disk drive.

CIRCLE 724 ON READER SERVICE CARD

Lenipen

Duncan-Atwell Computerized Technologies Inc.
1200 Salem Ave.
Hillside, NJ 07205
(201) 355-1690

List Price: \$165

Requires: 128K RAM, one disk drive.

CIRCLE 725 ON READER SERVICE CARD

VersaWriter

Versa Computing Inc.
3541 Old Canejo Rd., Suite 104
Newbury Park, CA 91320
(805) 498-1956

List Price: \$299, including graphics tablet

Requires: 64K RAM, one disk drive, color/graphics adapter, and game controller.

CIRCLE 726 ON READER SERVICE CARD

BULL????

A lot of it is being slung around! Clearly, you need a lot more than just an index finger and an elbow to meaningfully use a computer. Is having a cluttered screen of options and windows easier? After the first blush of novelty and gimmickry and puffery wears off, will it really be easier and better? One thing is for sure — it is going to take time to shake these new systems out and make them functional in user environments.

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SysteMate allows an unlimited number of nested menus tailored to your needs. To run an application, just press a key. SysteMate provides the logic to run the application. PC-DOS or the application programs, it just eliminates all the redundant unnecessary BULL!!!!

At last, SysteMate enables DISKETTE SYSTEM users to set up their systems and procedures the way they should be set up. With SysteMate screen displayed pre-execution and post-execution operating instructions, you can systematically prevent problems instead of having to constantly cure them.

For HARD DISK SYSTEM users, SysteMate is a dream come true. You can effortlessly navigate between your various applications without any unnecessary BULL!!!! Easy to use, efficient tree structured directories are a breeze.

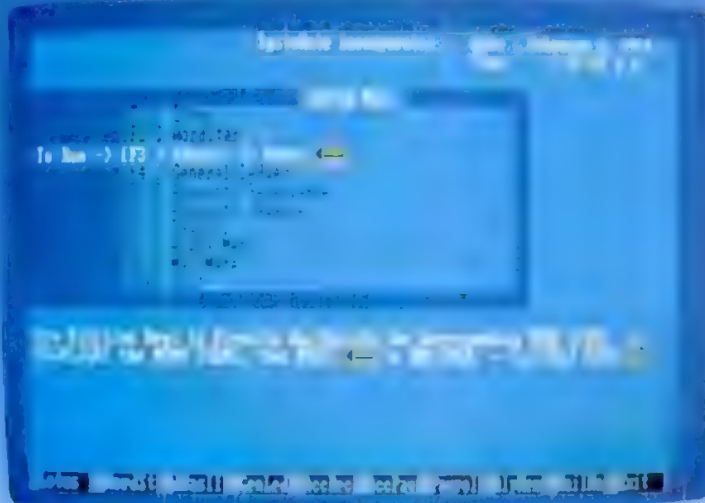
SysteMate is no BULL!!!! It works on the IBM PC, IBM-PCjr., IBM-XT, COMPAQ, and other PC-DOS systems. It's available now for only \$149.95*, complete. It will pay for itself the very first time that you use it, in peace-of-mind, because you will immediately realize how simple it is and how it is going to help you in so many ways! Ask for it at your dealer, or order direct.



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- who want to organize their computer activities in a step by step systematic way
- who do not want to spend weeks learning, or training new personnel, about redundant unnecessary BULL!!!! that has nothing to do with their problems
- who want to use their computer to increase productivity and profits

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The Shape (and Color) Of Things to Come

Color mapping, blink-based animation, and other visual treats can be accomplished on your PC, thanks to four new products that create and display graphics with NAPLPS code.

The heart of data communication is consensus, not technology. All of the cables, modems, and microwave hops on earth are useless if the sender and receiver disagree on how to interpret the data being sent.

Fortunately, such a consensus does exist, at least for text. Nearly all microcomputer manufacturers have an agreement that certain bytes, when sent to a screen or printer, will be displayed the same way. This agreement is called

ASCII, the American Standard Code for Information Interchange.

But suppose you want to send a command for "circle" or "line" or "blue"? You're in trouble. There is no accepted way to encode a pie chart on an IBM PC



and have it appear as anything better than lemon meringue on an Apple II.

More than any other problem, this lack of a standard has inhibited the spread of graphics applications for micros. Graphics software developed for one micro often has to be almost completely rewritten before it will run on another brand of micro. And unlike textual databases like CompuServe—which use the ASCII standard—graphics databases would have to be specific to a particular kind of micro.

Hope exists, though, in the form of NAPLPS (*nap-lips*, as the cognoscenti like to say), the North American Presentation Level Protocol Syntax. NAPLPS holds promise as a standard for two reasons: It can be used as a standard for encoding and displaying graphics in similar ways on different machines, and it compresses complex graphic images—such as circles, lines, and polygons—into short strings of bytes, making it an efficient way to store and transmit graphics.

Like any standard, NAPLPS will ultimately be judged by the number of converts it can claim. Some heavy hitters have already jumped on the wagon; these include AT&T, Times-Mirror Corporation, Knight-Ridder, and Cox Communications. Scores of NAPLPS software programs and hardware vendors have emerged in the past few years. Current applications range from mass-market NAPLPS databases to placement of small database systems in shopping malls, hotels, and airports. NAPLPS graphics are also being used for business presentations and computer-aided instruction. (For a brief discussion of NAPLPS features and terminology, see sidebar, “A NAPLPS Primer and Glossary.”)

NAPLPS Comes to Your PC

Until very recently, PC owners could not use their micros to tap into NAPLPS. NAPLPS graphics were created and displayed on expensive standalone “frame-creation” workstations and decoder terminals. In the past few months, though, PC-based products for displaying, creating,

and organizing NAPLPS frames have appeared. This review will look at four of those products.

On the most rudimentary level, graphics display software must place graphic images in the proper place on the screen and display the images in the proper colors. NAPLPS defines a rich variety of graphic shapes, including geometric primitives like “point,” “line,” “rectangle,” and “polygon,” alphanumeric characters, rectangular mosaics that can be pieced together into complex images, and non-ASCII alphabetic characters (such as special German or Danish characters). In

addition, NAPLPS uses color mapping to set each dot on the video screen to one of a large number of colors.

A PC equipped with the standard IBM graphics adapter is perfectly capable of displaying all NAPLPS graphic shapes correctly. Since the graphics adapter does not use color-mapping technology, though, and only displays four colors simultaneously, it is not possible to write full NAPLPS decoding software for this hardware. Even most non-IBM color boards—such as Plantronics’ COLORPLUS—can only display a predefined set of 16 colors.

MVI: A Videotex Interpreter

If you want to take advantage of NAPLPS extensive drawing capabilities and can live with limited color capability, Microstar Software Ltd. offers a creditable software NAPLPS decoder to be used with the PC.

The *Microstar Videotex Interpreter (MVI)* can display NAPLPS graphics either from a floppy disk or from a remote NAPLPS database. *MVI* can also download videotex frames from remote databases for storage on your local disk, upload videotex frames to other computers, and print graphic renderings of NAPLPS frames on Epson and IDS Prism printers. You can also use *MVI* in a non-NAPLPS dumb terminal mode to access and retrieve data from ASCII databases like CompuServe.

MVI is delivered on one copy-protected disk, along with a manual. I found the copy-protection scheme worrisome, especially since the *MVI* writes to the disk during use (to update a table of communications parameters set by the user). Microstar should provide at least one backup, rather than simply assuring me that I can replace a damaged master disk “for a nominal fee upon receipt of the original.” In spite of the copy protection, *MVI* will run on the hard disk or RAM-disk. To run *MVI* from, say, drive C, you

need to copy the master-disk files to drive C and then, with the master disk in drive A, run C:MVI. *MVI* will check that drive A contains a true master disk, after which you are free to replace it with, say, a data disk.

MVI requires an IBM PC (or XT) or compatible. (Microstar advertises Compaq and Columbia compatibility. I ran the program on both a Compaq and an IBM PC.) You need 192K RAM, one 320K disk drive, an IBM color adapter or Plantronics COLORPLUS card, a color monitor, one asynchronous communications adapter, and a modem (if you want to access remote databases).

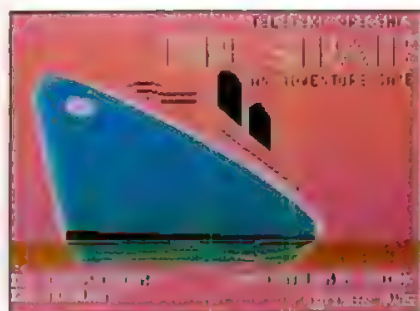
Manual Labor

If you, like I, have an allergy to manuals and prefer just to put in a new disk and crank up the software, you’ll be in trouble. The documentation falls into the category “OK once you know how the program works.”

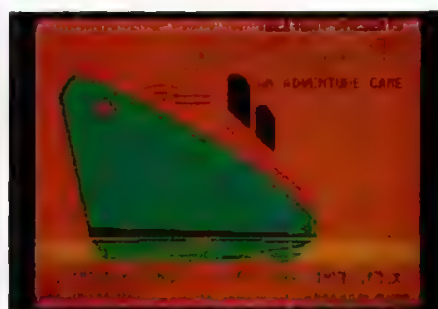
The manual starts with a half-hearted tutorial designed to log you on to a videotex database. This led to a confusing message: Communications Parameters. I was told to refer to an Appendix G (which was missing) for help in filling in the necessary values. Some parameters (baud rate, parity, and so on) were familiar, but



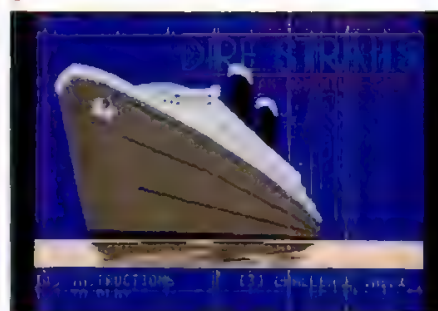
1



2



3



4



5



6

1. Full-blown NAPLPS frame, displayed through standalone decoder in RGB video. (Time Video Information Services.)

2. With a Plantronics COLORPLUS board, Microstar's software NAPLPS interpreter (MVI) modifies some original colors, but produces a creditable reproduction.

3. MVI pares the original down to four colors on IBM's color graphics adapter (palette 0, green, red, brown and a black background). Note that upper deck of ship disappears into background.

4. The composite video output of the IBM color graphics adapter is almost useless if you need to read text.

5. MVI switches easily to IBM's second default palette (cyan, magenta, white).

6. We can change MVI's default assignment of IBM colors to NAPLPS colors and improve the display. Note that the upper deck has reappeared.

others (XOR, CTRL, PHONE, LOGON) are specific to MVI and are only explained deep inside the manual.

Since most first-time users will be more anxious to see if MVI really displays snazzy NAPLPS graphics than in running through a short course in data communications, Microstar should provide a few sample NAPLPS frames on the master disk along with a tutorial on the relatively simple procedure for displaying those files.

Great Shapes

The manual again refers to Appendix G for a list of available NAPLPS databases. If it had been there, it would have been helpful. After struggling through the tutorial, I connected to Grassroots, a huge NAPLPS database in Winnipeg, where I have an account. Bingo! A full-blown NAPLPS frame appeared on my color

monitor (and in shades of green on my internal Compaq monitor).

I noticed two things immediately. First, the NAPLPS geometric shapes decoded

The problem with color translation rests with IBM's limited color capabilities and not with MVI.

perfectly. This is no small feat. I have seen a number of supposedly "finished" software NAPLPS interpreters, and even a couple of standalone decoders, display all kinds of bizarre, incorrect shapes. (There

is even a term, "exploding PDIs," for what some poor decoders do to the Picture Description Instructions that make up NAPLPS frames.)

Second, the colors were weird. Grassroots uses up to 16 colors simultaneously (drawn from a total palette of thousands of possible colors) on each frame. Since the IBM color adapter can display only four colors at any one time, MVI had to translate some of the Grassroots colors into one of four IBM colors. Grassroots' blue, for example, turned into IBM red. Seeing familiar Grassroots screens like this was about as disconcerting as seeing an IBM salesman in madras pants.

But, oh, what a sense of liberation! Equipped with only a standard PC, free of my \$1,600 outboard NAPLPS decoder, I was accessing an extraordinary world of graphics not originally designed with the IBM PC in mind.



Since receiving *MVI*, I have displayed hundreds of NAPLPS frames, including some I created myself to test how *MVI* handles some of NAPLPS' more exotic features. Microstar told me *MVI* would correctly decode all NAPLPS except color-map manipulations (which includes "phased blink"), Dynamically Redefinable Character Sets (DRCS), which lets the user create up to 96 customized characters, and unprotected fields. With one major and several minor exceptions, *MVI* works as advertised.

Polygons, lines, rectangles, arcs, and dots all appear correctly, even when combined with the four NAPLPS default fill patterns and line textures. Every screen from Grassroots seemed fine in this regard, along with all my home-grown test frames. The only errors I found occurred in a few complex screens produced by artists at Time, Inc., in New York City. Several polygons were shifted away from their correct positions. (Since these frames had been produced on a non-NAPLPS terminal and translated into NAPLPS by Time, Inc.'s conversion software, it is possible that the problem is with the frames, rather than with *MVI*.)

With one important exception, text characters appear in the right size and place, even when subjected to exotic NAPLPS scaling and rotation commands. A serious flaw occurs, though, when a string of text contains a carriage return and linefeed. In NAPLPS, like ASCII, these bytes should force the cursor down one line to the left margin. *MVI* uses compiled BASIC for disk I/O, and since BASIC uses the carriage return/linefeed sequence to mark "end of record," these two bytes are never passed to the NAPLPS interpreter. (The solution is to set the eighth bit of each byte to one. Microstar promises such a utility program in future releases.) Since it is common for NAPLPS artists to begin each new line of text with an explicit "set drawing point" command, rather than relying on the carriage return/linefeed sequence, this bug does not show up often. In some databases, though, the bug

could severely distort many pages.

The NAPLPS supplemental character set, which includes many non-English alphabets, displays correctly, and NAPLPS' powerful macro capabilities

MVI was able to decode the NAPLPS geometric shapes perfectly, but the colors were weird.

perform well. In fact, other than the non-supported features mentioned earlier, I could find only a few things that did not work: user-defined texture patterns, the mosaic character set, the incremental point, line and polygon features, proportional spacing, underlining (which works intermittently), and visible cursor (though Microstar says a box cursor is available in a new release).

Microstar's manual doesn't mention it, but *MVI* will only work with 7-bit NAPLPS. Although nearly all NAPLPS databases use the 7-bit variant of the standard, there's one important exception. Viewtron, the Knight-Ridder database in Florida, is an 8-bit NAPLPS database. This is one of the best videotex databases around, and *MVI* will not allow you to access it.

Color Definition

The problem with color translation rests with IBM's limited color capabilities and not with *MVI*, which performs as advertised. NAPLPS can produce a nearly unlimited variety of colors that can be mapped into a theoretically huge color table. In fact, most standalone decoders allow for 16 simultaneous colors, chosen from a palette of 512. IBM, in contrast, supplies only two palettes of three predefined colors: green, red, and brown in palette 0; and cyan, magenta, and white in palette 1. Including a background color (which *MVI* always sets to black) each

IBM display has four possible colors.

MVI translates NAPLPS color definitions into IBM colors through a two-step process. First, the software creates an imaginary color table of 16 colors, corresponding to 16 default NAPLPS colors (an 8-level gray scale, plus blue, magenta, red, yellow, green, and cyan, with two of the 16 slots unused). Next, each of the 16 slots is assigned one of the four IBM palette entries. As it reads a new NAPLPS color definition, *MVI* first determines which of the default NAPLPS colors is the best match. It then checks the IBM color associated with this default NAPLPS color and sets the proper part of the display to this color.

It does not take much for a low-key NAPLPS page to appear either garish or illegible. Using *MVI*'s normal assignment of IBM colors to NAPLPS colors, for example, a green NAPLPS rectangle on a dark gray background would appear as a green rectangle on a green background—invisible!

Fortunately, the user has some control over the color display. First, *MVI* lets you quickly switch between the two IBM palettes at any time during a display. While this will not make invisible graphics reappear, it does often make ugly frames more—uh—palatable. I found myself constantly switching back and forth (by pressing the F6 key) as I displayed screens.

MVI also allows you to change the correspondence between IBM colors and each of the 16 default NAPLPS colors. If you are not happy with dark gray showing up as green or cyan on your PC monitor, for example, you can assign one of the other three PC colors to the dark gray slot. To do so, you choose "Colour Table" from the "Communications Parameters" submenu. The 16-slot color table appears as two rows of eight colored boxes. The boxes are IBM colors, and each one represents one of the NAPLPS default colors. Bizarrely, *MVI* does not tell you which IBM color box represents which NAPLPS color. Discovering that information required making a phone call to Ottawa.

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While graphics may occasionally disappear into their backgrounds, *MVI* offers a handy feature that increases the chance that text will be visible. On the "Communications Parameters" display,

MVI is particularly attractive for applications where graphics are created with its color limitations in mind.

the user can turn on something called "XOR." When XOR is on, *MVI* examines each pixel of a text character and "exclusively-or" its color bits with the color bits of the background color. Green text on a green background, for example, will be changed to black text on a green background.

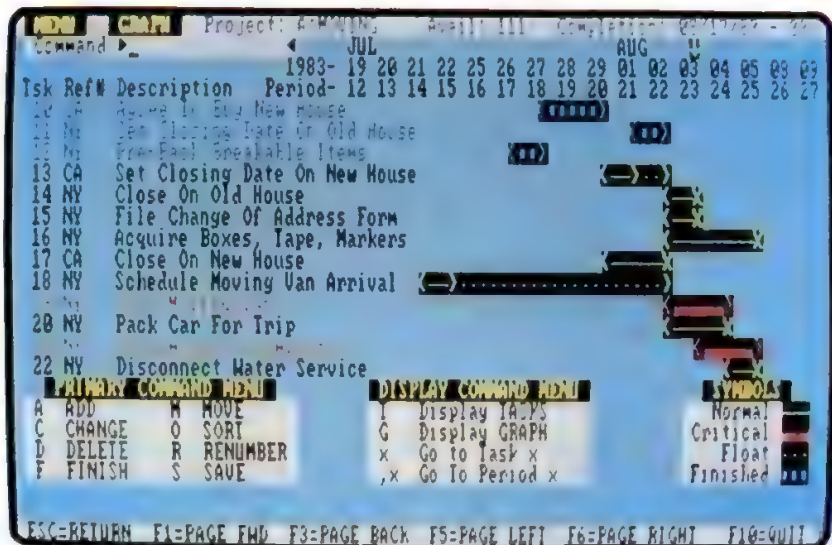
In spite of all these potential color problems, I was surprised at how seldom I ran into indecipherable frames. A few minutes of twiddling color table entries invariably improved the picture. I can certainly conceive of NAPLPS frames that would be almost useless when viewed through *MVI*'s filter—an advertisement for paint, for example—but the vast majority of frames were useful, if not always aesthetically pleasing.

I strongly recommend that you use an RGB monitor with your IBM color graphics adapter. IBM's composite video signal is scandalously bad, and small NAPLPS letters often "bleed" to the point of illegibility.

MVI also runs with a Plantronics COLORPLUS board. The 16 simultaneous colors on the COLORPLUS board overcome many of IBM's graphics adapter's color problems.

Hidden Treasures

MVI is more than a NAPLPS decoder, though you have to read the manual pretty



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closely to discover its other features. First, it can be used as a general communications package. You can define a specific set of communications parameters for each of many databases you use. These may be NAPLPS or ASCII databases, since *MVI* can also be put into ASCII dumb terminal mode. Once you have defined a database, its name will appear in a list of available databases whenever you start up *MVI*.

Besides the normal communication characteristics (speed, parity, and so on) *MVI* also has a keyboard utility that lets you define the string of characters you want your modem to dial in order to connect to the database, the color table to be used with this database, and character strings to be attached to each of the ten PC function keys. I have defined Grassroots as database 1 in my directory of databases, for example. Once I start up *MVI*, I press two keys to get *MVI* to dial the local Tymnet phone number, identify itself to Tymnet, input the 17-digit Tymnet/Datapac address for Grassroots, select the proper Datapac channel, and connect to Grassroots. And I have defined the F2 key to enter my Grassroots user ID, and F3 to enter my password.

MVI can upload and download files between your PC and a remote computer. These file transfers use a simple XON/XOFF protocol with no error checking. Both directions work fine, though you feel like Houdini once you've figured out how to do it. Transfers are initiated by pressing the Ctrl key and one of the function keys. There is no menu and no on-line help.

Getting It down on Paper

As you look at a NAPLPS graphic, you can also print it on either an Epson printer (in shades of gray) or an IDS Prism printer (in color). I tested only the Epson print program. How impressive the graphics output is depends on the colors in the original frame. Some of the printouts were good enough for "oohs" and "aahs" from friends. I also ran *MVI* with a public-domain graphics printing program for the

Okidata 92, with good results.

If you don't have a graphics printer, *MVI* will still print the extracted text from any NAPLPS frame on a plain ASCII printer. This is useful if you want to quickly print a news story or a stock market listing. I used this feature to print the text from a series of instruction screens for one NAPLPS database.

All in all, I am pleased with *MVI*'s performance. With minor exceptions, it lives up to its claims. It is an inexpensive way to display nearly any NAPLPS graphic. *MVI* is particularly attractive for applications where graphics are created with its color limitations in mind. Used in conjunction with a NAPLPS frame-creation unit (such as *Picture Painter*, which is reviewed

below), *MVI* could be a great tool for displaying and disseminating business or even mass-market graphics packages.

The *MVI* staff, particularly president Peter Jordan, who wrote most of the program, was extraordinarily helpful. Never did I hear "Oh, you're doing it wrong" when I called to report bugs. Microstar appears to care about its customers.

MVI's greatest obstacle is its own poor documentation and user interface. This is a difficult package to use. The need for on-line help and much better prompting is essential. Now that the bulk of the NAPLPS decoding work is done, I hope the folks at Microstar invest more energy in improving the lot of the inexperienced user.

Quickpel: A Complete NAPLPS Interpreter

Some users, graphic artists, say, may not be happy with the limitations imposed by software decoders that rely entirely on standard IBM hardware. Some of the snazziest NAPLPS features—for instance, color mapping and phased blink, which can be used for animation—just can't be produced with an IBM graphics adapter.

Until now, the only alternative has been to connect a standalone decoder to your computer either via phone or an RS-232 cable. Such decoders generally cost around \$1,500.

An extraordinary new plug-in PC board changes all this. Quickpel is a complete NAPLPS interpreter that fits into one PC expansion slot. It receives NAPLPS bytes over the PC bus—either from disk or from a remote site via a separate asynchronous adapter—and produces a composite video signal which you feed into your color monitor.

As if full NAPLPS interpretation were not enough, Quickpel also lets you load non-NAPLPS program codes onto the board. These programs—known as "tele-

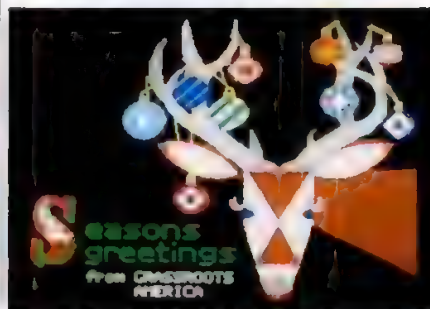
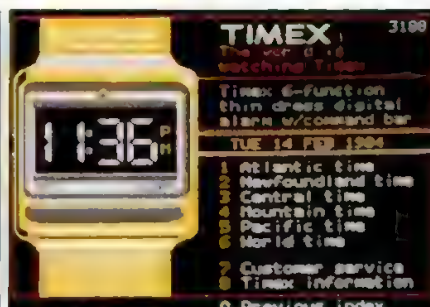
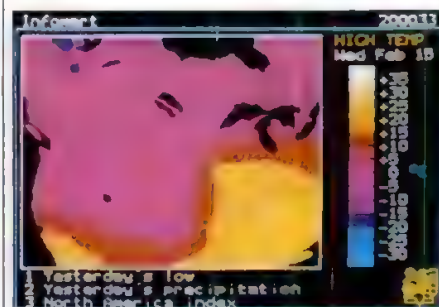
software"—can be interspersed with NAPLPS and can access and manipulate the entire bit map and color table.

The ramifications for NAPLPS applications are enormous. Quickpel combines the advantages of compact and standard NAPLPS encoding with the high-speed animation possible from direct control of the screen's bit map.

I used Quickpel in both a PC and a Compaq. The manufacturer, a new company called Micropixel, Inc., assures me the board will run in an XT and the Eagle as well. The board I used was a prototype, but both the hardware and software were cleaner than on many finished products I've seen. Production units were scheduled for delivery during the second week of March.

Installation was straightforward; Quickpel plugged into one expansion slot. The prototype was a couple of millimeters too long, so I popped the plastic card guide off my Compaq to make room.

The prototype unit produced only composite video, which was accessed from a phono plug. A PCjr-like RF connector is



Grassroots, an agricultural database in Winnipeg, Canada, produced these NAPLPS frames for merchandise ordering, merchandise information, weather reports, market reports for agricultural products, and season's greetings. From left to right: Infomart's weather report, Timex, Inc., ad, Manitoba Cattle Producers Assoc.'s market report, advertisement for the LP "The Bay Windows," and seasons greetings from Grassroots.

planned for production units, so Quickpel can be used with a standard color TV set. I groaned upon hearing that no RGB output was planned; visions of the fuzzy, often illegible characters produced by the IBM color adapter's composite signal raced through my mind. And indeed, when I first powered up the computer with Quickpel installed, I groaned again. A fuzzy, wavy greenish yellow blob intruded on the upper left corner of the blank monitor screen. But then I pumped one NAPLPS frame into Quickpel. Wow! Kudos to the video engineers. Quickpel produces one of the cleanest, sharpest composite signals I've seen. From that moment on, I never missed the RGB output.

Full NAPLPS Interpretation

Hearing a vendor claim his product is full NAPLPS is a bit like listening to someone tell you he never broke the law. "Never even drove 56 mph?" you ask. "OK," he admits, "but that's not really breaking the law. . . ." Quickpel seems true to its claim, though. In the 24 hours I had the board, I tried every exotic NAPLPS string I could invent. Everything worked perfectly. Blink, color mapping,

textures, cursor manipulation, character scaling, macros, mosaics, supplemental characters—all 100 percent. I certainly didn't exhaust all possible permutations of NAPLPS commands in the short time I had the board, but Quickpel didn't suffer from any of the problems common to other NAPLPS decoders. If complete adherence to the NAPLPS standard were important to me (which it is), I would pick the Quickpel board as my decoder (which I will).

Quickpel produces a common NAPLPS screen resolution of 256 by 200, and it displays 16 simultaneous colors from a palette of 512. Quickpel comes with a DOS 2.0 device driver. Once installed, displaying NAPLPS frames is as easy as "COPY <file> QPEL:." PC programs can access QPEL like any normal DOS device. In addition to the driver, Quickpel comes with VTX, a communications program disk for access to remote computers. When you use VTX, all keyboard input is sent out through an asynchronous adapter, and all input to the comm port is directed to Quickpel. The prerelease version of VTX also allowed for a dumb terminal mode so that incoming

data would display on the monochrome monitor. File transfers of NAPLPS data also worked well.

The NAPLPS interpretation is handled by an Intel 8088 (the same microprocessor that runs your PC) on the Quickpel board. Ingeniously, the 8088 is controlled by a multitasking executive, which doles out processor time to the NAPLPS interpreter task and any other task that wants attention. This "other task" can make full use of Quickpel's RAM, including the bit map and the color map. It could even produce its own NAPLPS code and send it to the NAPLPS interpretation task for execution. The 8088 machine code for these non-NAPLPS tasks can be loaded into Quickpel much like standard NAPLPS code. Various "escape sequences" tell the executive whether incoming bytes are NAPLPS or machine code.

RAM includes 64K for the bit map and NAPLPS scratch pad and 16K for telesoftware code and data. The NAPLPS interpreter is stored in 80K bytes of ROM, and telesoftware and communications management occupies another 16K bytes of ROM. Quickpel also includes 256 bytes of EEPROM, so small amounts of data (like



the user's name, or a database's phone number) can be stored even when the PC is shut off.

Two demo programs supplied with Quickpel showed the enormous potential for telesoftware applications. One pro-

Writing programs for Quickpel is as easy as writing for your PC's 8088.

gram drew colored lines of gradually varying lengths on the screen, producing a kaleidoscopic effect. The screen manipulation was much faster and more complex than anything that can be done with a NAPLPS interpreter. The second program produced a "pseudosprite." First, a normal NAPLPS page full of graphics and text was displayed. Then, a small rectangle began to zip across the screen from left to right. Each time the rectangle moved, the portion of the screen that had been overwritten was restored to its original state. This type of fast, nondestructive animation is not possible with normal NAPLPS decoders, which cannot save portions of the bit map for later restoration.

Since the 8088 executive is multitasking, it is possible to run, say, a telesoftware task concurrently with a NAPLPS decoding task. I tried displaying a NAPLPS frame while running the kaleidoscopic demo. The effect was bizarre: As the executive switched back and forth between tasks, interwoven pieces of each of the two graphics were displayed.

Writing programs for Quickpel is as easy as writing for your PC's 8088. Programs must be .COM files and can be assembled (or compiled) and linked on the PC. The finished program is then loaded onto Quickpel with a "telesoftware loader" provided with the board. The Quickpel documentation, which was sketchy during the prototype phase, includes a programmer's description of the board (that

is, a memory map), a list of software interrupts, and the like. Micropixel is also considering selling a "programmer's toolbox" for the board, which will include libraries of assembler subroutines to facilitate access to executive calls, I/O routines for various languages, and NAPLPS coding routines.

All of this wonderful telesoftware raises a problem. NAPLPS is valuable precisely because it is a standard. NAPLPS says nothing, however, about telesoftware. Users must be aware that as soon as they include telesoftware in the stream of bytes they send to a decoder, then they are limited to one make of decoder, that is, the Quickpel (or its stand-

alone cousin, the EGT-100 by Electrohome, Ltd.). Even if Micropixel can convince the various standards committees that telesoftware is a wonderful extension of NAPLPS, true standards are probably years away.

In summary, Quickpel is a great product that combines the advantages of a first-class NAPLPS decoder with the power and flexibility of a programmable color-mapped video display board. Whether you simply want to display NAPLPS graphics or write sophisticated graphics application programs, it is hard to beat the power and convenience of Quickpel. And the price is lower than most standalone NAPLPS decoders.

Picture Painter: A Frame Creation System

When you get tired of looking at other people's NAPLPS pages, you can create your own on your PC. *Picture Painter* is a powerful NAPLPS creation system that holds its own—in performance, if not in documentation—against much more expensive standalone competitors.

The minimum system configuration for *Picture Painter* is pricey. You need a PC with at least one 320K drive, 128K RAM, two asynchronous adapters, a Summagraphics Bit Pad One tablet, a color monitor, and a standalone NAPLPS decoder. Cablesare will fix you up with the last three items for about \$4,200, though you'd probably save money buying them on your own.

Your choice of decoder is important. Since most decoders on the market only display a subset of NAPLPS, you can easily find yourself in a bind where your *Picture Painter* encodes graphics that your decoder can't display. I used a Norpak Mark IV Videotex Decoder for this review and found that it could not display underlined text, user-defined textures, or phase blink correctly, even though the *Picture*

Painter could produce them. A Quickpel/*Picture Painter* combination would be an ideal setup, though Cablesare will have to adapt its software to run with Quickpel's device driver.

Groping through the Basics

Picture Painter is not as easy to learn as it should be. It takes a lot of nerve to ask \$3,000 for software and then charge an extra \$50 for inadequate documentation. The documentation consists of a 7-page typewritten installation guide (which works) and a hefty "Picture Painter Reference Guide." The reference guide is aptly named. Relying on it to learn how to use the system is a bit like trying to learn a language from a dictionary. No tutorial is provided, and there is no introduction either to NAPLPS or *Picture Painter*. And the reference guide constantly refers you to a missing "Advanced Techniques" section. Cablesare is aware of the problem; a customer support representative told me most clients need a day or two of training by a Cablesare instructor. To its credit, the reference guide is well written and organized. And, once you know the

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basics, it can be very valuable.

Cableshare supplies a colorful acetate overlay for your bit pad. The upper part of the overlay is marked into a grid which corresponds to the dimensions of the display monitor. When you move the electronic pen over the acetate, a crosshair cursor scoots across the screen. The lower part of the overlay is split into 164 small squares, each labeled with a function such as "rectangle" or "set color," which you select by pressing the pen to the square. All graphics-creation functions, from drawing circles to changing the color of a polygon, can be executed from the tablet. You can even enter text into the display from the tablet, since the squares in the lower left contain characters in a QWERTY layout.

All operations can be performed from the IBM keyboard, too. This is valuable, since some functions, inserting a string of text into your picture, for example, are done much more quickly from the keyboard than from the tablet. Drawing graphics, though, is usually more efficient from the tablet.

When I first started *Picture Painter*, I thought it had crashed. My color monitor was connected to a decoder, which was connected to the COM1:PORT, displayed a Cableshare logo at the bottom of the screen. And the PC's monochrome monitor (or the Compaq's internal monitor, in my case) showed nothing except for the word: Cursor: 1 0. No menu, no help screen, nothing. The "Help" square caught my eye, so I attacked it with the pen. "Help with what?" We'll start slowly, I thought, so I pressed the "Rectangle" box. "No help available for that box." OK, we'll try "Circle." Same response. Continuing boldly onward, then, I tried the "Rectangle" square and hoped for the best. Aha! The word *rectangle* appeared at the bottom of my color monitor. After a little experimentation and a peek at the "Rectangle" section of the reference guide, I found that rectangles are drawn by moving the pen/cursor to the spot on the tablet/screen where you want

A NAPLPS Primer and Glossary

Here's a brief key to help you decode basic NAPLPS concepts and terminology.

Like too many computerites, NAPLPS converts tend to bombard one another with esoteric terminology. This brief NAPLPS primer and glossary may help you return some of the fire.

NAPLPS (North American Presentation Level Protocol Syntax): A proposed set of rules for encoding and decoding computer graphics instructions. If lots of graphics hardware and software manufacturers agree to interpret NAPLPS instructions, then NAPLPS will become a graphics "standard."

To understand one of NAPLPS's greatest strengths—its compactness—imagine that you had to describe to a friend on the phone how to draw a picture of a red ball on a green rectangle.

Suppose you start with the instruction "pick up the green pen," and then say, "Draw a solid rectangle that goes from the upper left-most square to the lower right-most square on the page." You then tell him to "pick up the red pen." And then you say, "Draw a circle with a diameter stretching from X-Y coordinate 100,100 to coordinate 200,100." If your friend is smart enough to understand ideas like "rectangle" and "circle," you'll get your drawing with just a few instructions and a few seconds on the phone.

NAPLPS takes this approach. It consists of strings of commands like "set color" and "draw rectangle." A NAPLPS decoder must be smart enough (that is, it must contain enough programming) to turn the abstract NAPLPS instructions into the thousands of individual bits that produce the graphic display on your computer's CRT.

The key is that the instructions transmitted to the computer are very con-

densed and abstract. Also, the instructions themselves are independent of any particular computer. In other words, as long as someone writes NAPLPS decoding software for machines like the IBM PC and the Apple IIe, then the same string of NAPLPS can produce the same graphic display on both machines. (Hardware differences still cause trouble, though. NAPLPS can define an orange rectangle, even though the PC can't display orange. The PC would have to substitute one of its available colors—red, say—while another more sophisticated color computer might really display an orange rectangle.)

Besides the basic geometric shapes (point, line, arc, rectangle, polygon), NAPLPS defines hundreds of other graphic commands, ranging from the normal alphabetic characters to European character sets and more.

(You can get official, complete NAPLPS specifications by sending \$20 plus \$4 handling to the American National Standards Institute, 1430 Broadway, New York, NY 10018, Attn: Sales Department. Specify Document X3.110 when ordering.)

Given these background concepts and the following definitions, you should be able to make sense out of NAPLPS talk.

Pixel: Short for "picture element," the tiny, dotlike units into which a video display is split. In medium resolution, your PC screen is made up of 200 by 320 pixels. Many NAPLPS decoders produce a display with 200 by 256 pixels.

Bit map: Depending on the particular display system, each pixel in the display is represented by a specific number of bits in memory. In the simplest case (black and white), each pixel occupies

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one corner of the rectangle to appear. You press down and then move to the spot where you want the diagonally opposite corner to appear and press again. Voila! A solid white rectangle flashed on the screen.

The principle applies to all the NAPLPS primitives. *Picture Painter* will draw arcs, lines, points, polygons, and circles. You simply supply the minimum coordinates to define the outline of the shape you want. The software draws the rest. Once you understand the principle, it's a snap to fill your screen with wild, varied shapes.

If solid white objects bore you, you can change fill patterns and colors. The "Texture Pattern" square lets you pick one of four default fill patterns: solid, vertical lines, horizontal lines, and crosshatch. (You can even customize fill patterns if your decoder supports this NAPLPS feature.) All subsequently drawn rectangles, arcs, circles, and polygons will fill up with the pattern you select. You can turn off all fill patterns if you just want to see outlines.

Color by Numbers

Color selection is fun. *Picture Painter* allows you to pick from 16 different color slots, labeled 0 to 15. When you start the system, each of the 16 slots is assigned a default color, like red, green, blue, magenta, or various shades of gray. Each color slot has its own box on the tablet, which shows its number and the default color assigned to it. To pick red, say, you just press the pen to the red box. From then on, everything you draw will be red. Press the pen to another box to switch colors.

You are not limited to the 16 default colors. You can define 4,096 colors with *Picture Painter* (though some decoders can only handle 512) and assign your choices to the 16 slots.

Picture Painter stands out from the competition when it comes to defining a color. You can choose from six different ways of creating, say, a flesh tone. First

one bit, which can be either on (white) or off (black). In color display, each pixel requires two or more bits, which represent either the values of red, green, and blue to be generated for that pixel or an index into a color table (see "color mapping" below). The display can be changed by changing these bits in memory. This chunk of memory is the bit map.

Video displays are sometimes described in terms of the number of vertical and horizontal pixels and the number of bits allotted to each pixel; for example, $200 \times 320 \times 2$ (in the case of the PC's medium resolution mode) or $200 \times 256 \times 4$ (for many common NAPLPS decoder displays).

Color mapping: Color monitors create all their colors by combining various amounts of red, green, and blue at each pixel. In one popular method for creating video displays, the display logic reads the amounts of red, green, and blue directly from the bits assigned to each pixel. Thus, in a 200 by 256 by 3 bit map, each of the three bits assigned to a pixel might be associated with one of the three basic colors. Depending on which of the three bits are on, the display logic can produce one of eight colors.

In another method, though, the bits assigned to each pixel do not actually represent red, green, and blue. Instead, the bits form a number which is a pointer into a color table or map. In our $200 \times 256 \times 3$ bit map, for example, the bits assigned to each pixel can contain a number from 0 to 7. This number refers to an entry or slot in a color map. When the video display logic reads the bit values associated with a pixel, it looks into the color table for the actual bits that define the relative values of red, green, and blue. This color table contains eight entries, each of which may use, say, 12 bits for color definition. Thus, while we can still only display 8 different colors simultaneously, each of these colors can

be defined by one of 4,096 different combinations of red, green, and blue.

And when we want to change the color of a large block of pixels on the screen, we don't have to change the values of all the associated bits in the bit map. We merely modify the bits which define the color in the particular color-map slot; this will cause all pixels which point to this slot to change color. NAPLPS uses this ability to change color-map entries at high speed to create special effects, like animation and sequential (phased) blinking.

Frame: One screenful of graphics. Sometimes called a "page."

Videotex: A system of large databases which can be accessed by many remote users from terminals, usually over telephone lines. Some videotex systems are mainly textual (such as CompuServe), while others contain graphics (Viewtron or Grassroots, for example).

Telesoftware: Some videotex operators have tried mixing NAPLPS code with actual binary program code. The program code is intercepted by the local terminal and executed instead of being displayed on the screen. The program code is called telesoftware.

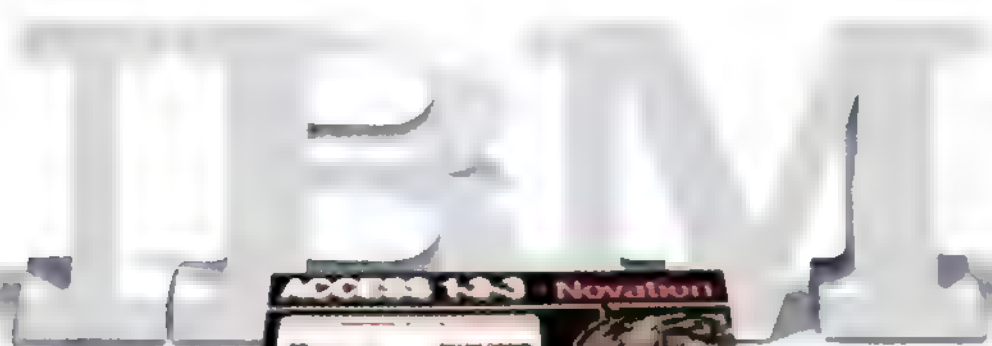
PDIs: Picture Description Instructions are the NAPLPS graphics codes that describe parts of graphics pictures, such as "rectangle" or "line."

DRCS: Dynamically Redefinable Character Sets. A NAPLPS artist can create up to 96 customized characters which can be loaded into the decoder and then called from memory.

Macro: To save transmission time, a frequently used string of NAPLPS can be assigned a one-character name. Ninety six of these "macros" can be created and downloaded to the decoder. From then on, the string can be called from the decoder's memory over and over again simply by supplying the macro's name. —D.M.

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NOVATION



you make the basic choice of whether you want to define colors based on the relative values of red, green, and blue in the final color (the RGB method) or the relative amounts of hue, saturation, and value (the HSV method). Each method has its adherents among artists, and it is to *Picture Painter*'s credit that both are available.

You select one of the 16 color slots to modify and press the "Set Color" square. A small rectangle appears at the

bottom of your screen showing the current color attached to the color slot you have chosen. If you slide the pen around the tablet, the color in the small rectangle will shift, as will any objects on the screen drawn with that color slot. The tablet is ingeniously organized into three axes (two vertical and one horizontal), each representing a red, green, or blue (or HSV) scale. Once you have mixed the color you want, you assign it to the color slot by

pressing the pen to the tablet. A message appears on the screen telling you the numeric values in the range 0 to 255 of each of the three components—either RGB or HSV—of your new color.

You can also mix a color with the PC's numeric keypad, which is organized into three columns. The 7 and 1 keys, for example, increase and decrease the red component, the 8 and 2 keys change the green, and the 9 and 3 keys shift the blue value. The 5 key is used to enter the final color mix.

Finally, if you need to mix a color exactly, you can type in the actual numbers of each of the three components from the keyboard.

These kinds of color map manipulations can produce startling effects. NAPLPS interpreters tend to display complex shapes rather slowly, but it is possible to make graphics flash onto the screen in an instant with the help of color map changes. As a simple example, I filled the screen with a black rectangle. Next, I defined yet another color slot to be black and, with this color, drew a large, complex polygon. The polygon was invisible, since it blended into the background. Finally, I entered commands to set this second black color slot to yellow. When the page displayed, I could not see the polygon build in the typical, slow NAPLPS manner (since it was black on black background). But suddenly, after it had been built, the polygon's color slot changed to yellow. In a split second, the polygon popped onto the screen.

Picture Painter can generate nearly every kind of NAPLPS code. This is quite an accomplishment, given the hundreds of graphics commands included in the standard. In fact, I found only a few features not implemented: relative coordinates, incremental point, line, and polygon, and "domain" definition (used to create graphics for decoders with a resolution higher than 200 by 256). These are hardly serious omissions. And as frosting, *Picture Painter* comes with a slew of snazzy fonts, so you can display your text in

Product Information

Finding out more about the products reviewed in this article may require a call to Canada.

Quickpel

David Carlisle & Associates
235 Yorkland Blvd., Suite 300
Willowdale, Ontario
Canada M2J 4Y8
(416) 492-9803

List Price: \$625

Requires: DOS 2.0, color monitor, modem.

CIRCLE 702 ON READER SERVICE CARD

VAST (Videotex Application System by Tayson)

Tayson Information Technology, Inc.
275 Comstock Road
Scarborough, Ontario
Canada M1L 2H2
(416) 288-0550

List Price: Single-user system, \$1,000 (Canadian); each additional user (maximum 8), \$420

Requires: For a single-user system, two disk drives, COM1: and COM2: ports, 128K RAM (with DOS 1.1) or 192K RAM (with DOS 2.0). For a two-user system, 256K RAM is required.

Recommended: Two double-sided disk drives, 256K RAM.

CIRCLE 704 ON READER SERVICE CARD

Microstar Videotex Interpreter (MVI)

Microstar Software, Ltd.
2211 Riverside Dr., Suite 207
Ottawa, Ontario
Canada K1H 7X5
(613) 737-9630

List Price: \$240

Requires: 192K RAM, one 320K disk drive, IBM color adapter or Plantronics COLORPLUS card, color monitor, one asynchronous communications adapter, modem.

CIRCLE 701 ON READER SERVICE CARD

Picture Painter

Cableshare, Inc.
P. O. Box 5880
London, Ontario
Canada N6A 4L7
(519) 686-2900

List Price: Software, \$3,000; documentation, \$50

Requires: 128K RAM, one 320K disk drive, color monitor, two asynchronous communications adapters, Summagraphics' Bit Pad One tablet, stand alone NAPLPS decoder.

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script, helvetica, roman, fraktur and several other variations. (Cableshare also offers a DRCS editor that runs outside of *Picture Painter* and lets the artist create custom character sets. I was not able to test this program.)

Editing in Pseudo-NAPLPS

Cableshare adopted an interesting and unique method for editing graphics. NAPLPS code consists of a string of bytes, which the decoder interprets sequentially. The decoder displays image after image as the bytes are received and decoded. The concept is not much different from a string of ASCII characters that your computer interprets and displays on the screen, one at a time. It would even be possible for the masochistically inclined to use a word processor to create an appropriate string of NAPLPS code which, if sent to an interpreter, would produce graphic images.

Most NAPLPS creation software tries hard to hide the NAPLPS code from the user. When an object, say, a rectangle, is to be edited, the user selects it by moving the cursor onto the subject.

Picture Painter, however, asks you to edit the actual NAPLPS commands rather than the screen images they produce. As you produce a page, *Picture Painter* translates your commands into a sequence of pseudo-NAPLPS statements, such as "Set Color 2" or "Rectangle 10 25 180 212." When it displays your page, *Picture Painter* is actually reading through this sequence of command statements and executing them one by one. When you edit a graphic, you actually edit one or more of these pseudo-NAPLPS statements. And when *Picture Painter* writes a graphic file to disk, it actually writes a series of lines of pseudo-NAPLPS.

While I found this approach to graphics creation clumsy at first, I am now a convert. This pseudo-NAPLPS language, dubbed CGUL (pronounced *see-gull*) for Cableshare Graphics User Language, offers features not available in other page creation systems. First, when you want to

display a frame, you have the option of stepping through it one statement at a time. As you do this, the CGUL statement appears at the bottom of your screen, while the graphic named in the statement is drawn on the screen. You can even step

Picture Painter asks
you to edit the
actual NAPLPS
commands rather
than the screen
images they
produce.

backwards through a file! And you can insert comment lines into the CGUL code, which can be a great help when you try to modify a complex page that was created months ago.

To edit a graphic—for example, to change a red circle into a blue one—you step through the frame until you find the offending "Circle" statement. (In a large graphic file, you can even use a search command to jump straight to each of the "Circle" statements.) Then you press the "Insert" square and select blue from the tablet. The next time you display that frame, the circle will be blue.

You can even edit a series of commands at once by defining them as a block, which can be moved, copied, rotated, and displayed.

The primary drawback to Cableshare's CGUL invention is that the graphics files that *Picture Painter* stores to disk are not real NAPLPS. In fact, you must convert each file using a translation program before you can display the graphics on any system other than a *Picture Painter*. As a result, you end up with two disk files for each page. And if you ever plan to re-edit your page, you must save the CGUL version, since *Picture Painter* cannot edit raw NAPLPS code. (Cableshare provides a

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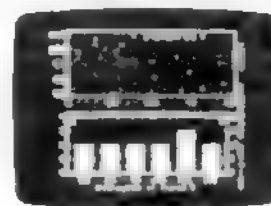
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NAPLPS-to-CGUL translator, but I've had mixed results with the files it produces, some of which contain weird garbage. A customer support representative admitted the program has bugs.)

Checks and Balances

In spite of this problem, I prefer Cableshare's CGUL approach. Seeing the actual commands in addition to the images they produce, has a great pedagogical value. I imagine artists trained on *Picture Painter* will have an easy time understanding and using the complex, powerful features of NAPLPS, such as macros, color mapping, and blink-based animation.

Picture Painting does a superb job of keeping self-destructive users at bay. All potentially destructive commands—such as erasing the screen or overwriting a pre-existing file—require confirmation before they execute.

The customer service folks at Cableshare were helpful and reasonably well

informed when I pestered them with questions about *Picture Painter*. My only bad experience occurred when I tried to report the one bug I have found. No matter how careful I was to press the electronic pen firmly down in the center of the proper square, *Picture Painter* occasionally shot back spurious messages or simply did not respond at all. I asked two graphic artists who have used *Picture Painter* about this, and both confirm the problem. Yet both a hardware engineer and a customer support rep at Cableshare told me the "bug" was my fault and that I should be more careful about where I put the pen. Uh-oh.

Picture Painter is a good product. With the addition of some extra hardware, it can turn your PC into a NAPLPS graphics creation station as powerful as stand alone systems costing many times more. Given better documentation and training material, *Picture Painter* would be simple enough for the occasional artist, yet powerful enough for the NAPLPS pro.

page overview of the software in the manual, it neglected to explain the fundamental principle behind its database organization scheme. Without this understanding, VAST's three primary functions, frame display, database management, and frame creation, are pretty inscrutable.

It took me and a couple of friends a half-hour of tentative button-pushing and leafing through the manual to divine the basic principle. VAST deals only with two entities: databases and frames. Frames must be part of a database, and they are numbered from 1 to 32,767. There is no way to access or create a frame that's not contained in a database.

The implication is that VAST will not allow a user to directly access a DOS file. In other words, 'I cannot copy NAPLPS DOS files onto my VAST data disk and then access them from VAST. Incredibly, the only ways to get frames into a VAST database are either to create them inside VAST using a relatively primitive frame-creation system or to crank up VAST's data capture feature to grab frames sent in over one of the asynch ports. In other words, if you create your pages on *Picture Painter*, you can't just grab them off the data disk and insert them into a VAST database. And once you make a VAST frame, there is no way to get it out of VAST's internal database format and write it directly to disk as a plain vanilla DOS file that you could edit with, say, *Picture Painter*. In fact, if you don't like VAST's unsophisticated frame creator, your only option is to connect two computers via the asynch ports. Only then could you send pages back and forth between VAST and the outside world.

I found this so bizarre that I refused to believe it. Not until I called the company for help did I discover I didn't need help, just different software. (I imagine the problem is a remnant of the days a year or so ago when there were no page-creation systems for the PC. In those days, the only way to get any NAPLPS file onto a DOS disk was via file transfer from a stand-alone page-creation system.) Tayson president Peter Richardson says he has heard

VAST: A Videotex Application System

You've arrived. You have the classiest graphics on the block, guaranteed to knock the socks off your boss, your clients, your mother, and anyone else you can get to look at them. Ah, there's the rub. How do you get them to look? You can't just saunter into the board room and hand the wolves a disk and a PC. You need an easy, seductive way for your audience to get the message.

VAST does the trick. This package turns your PC into a single or multiuser NAPLPS videotex system. The basic idea is that your PC is a videotex host that serves videotex decoders connected to its communication ports. The end-user sits in front of a decoder/monitor with a keypad/keyboard and winds through a database of linked NAPLPS frames. The system operator (yes, *you*) organizes the frames and establishes the links.

The burden of setting up a fun, easy-to-use database rests on your shoulders. If you do a good job, the end-user has only to sit back, watch the graphics, and press an occasional button on the keypad. My 2-year-old son even got into the act.

Were it not for a couple of major omissions in the software, VAST would be an ideal tool for creating interactive business presentations, in-house information, training databases, advertising-supported public videotex systems for shopping malls, hotels, airports, and so on. Even as it stands, though, VAST is a useful product that provides a great excuse for jumping on the NAPLPS wagon.

Inscrutable Functions

The hard part is learning how to use VAST. While its manufacturer, Tayson, did have the courtesy to provide a half-



this complaint from other users. A spokesperson reported that the problem has been eliminated in the currently available version.

Once I accepted the world according to VAST, things went better. VAST provides three ways to view frames, each of which pumps the NAPLPS to an external NAPLPS decoder. First, the system operator can sit at the PC keyboard and display individual frames over one of the asynch ports. Second, you can define a sequence of frames—say, frames 1 through 25 under database “Business”—and have VAST display them one after another in a never-ending cycle. Finally, you can jump into one of your linked databases and relinquish control to the end-user at the remote decoder, who can navigate from frame to frame based on menu selections you provide during database creation.

Defining a NAPLPS Database

Defining a new database is straightforward. VAST is menu-driven, and my only complaint is that some of the menu choices are needlessly cryptic. To make or modify new databases, for instance, you pick either “Create/Modify Frame Parameter Block” or “Create/Modify Frame Destination Table” from the main menu. Why not “Setup Database” and “Link Database Pages”?

When you create a database, you specify communications parameters for the comm line you want the database to use. You can enter a short description of the database. If you want to “billboard” frames (that is, those displayed in a cyclic, automatic mode), you specify which range of frames to billboard and the number of seconds the system should pause between each frame (this interval cannot vary from frame to frame). VAST can also put a digital clock of varying sizes and colors on each billboard frame; you define the size, color, and location of the clock.

VAST has a clever variation on the billboard theme. When you crank up a database on a comm line, you can tell VAST to go into a temporary billboard mode while

it waits for a passerby to start pressing keys. This is much better than just having a static title page staring out into space when the system is not being used. In a shopping mall, for example, VAST might billboard a series of eye-catching ads

Not until I called the
company for help
did I discover I
didn't need help,
just different
software.

whenever it is not being used interactively by passersby. You tell VAST which frames to cycle through when in this automatic mode. And you can define which key you want the user to hit to interrupt the billboard and jump into the interactive database. And finally, you specify the number of minutes and seconds you want VAST to lie dormant before it restarts the billboard. Thus, if a user walks away from the system in the middle of the database, VAST will automatically reset itself. I amused myself one evening by setting up a database and timing the billboard functions with a stopwatch. Everything worked out right to the second.

Frame Creation

Once you set up the database parameters, you need to get some frames. One option is to create them from scratch. VAST has an unsophisticated but easy-to-use frame creator. You can use all the NAPLPS geometric primitives in 15 colors and shades of gray. Frames can contain graphics and text, and they can be recalled from a database for later modification.

Serious artists will miss color mapping and other sophisticated NAPLPS features like macros, DRCS, and phase blink. But for many business applications, particularly presentations or training systems, the frame creator should be adequate.

VAST includes a curious so-called “Text Editor” that allows you to display and edit the string of NAPLPS bytes that make up a frame. (This is not pseudo-NAPLPS like Cableshare’s CGUL, but actual NAPLPS bytes.) First, fiddling with NAPLPS this way makes about as much sense as writing programs with DEBUG. It may be a neat macho trick, but it sure isn’t very efficient. And VAST’s editor makes EDLIN look good by comparison.

Capturing Frames

VAST can also capture NAPLPS frames from other computers. You have two options. In the one case you connect your VAST PC to another computer via an RS-232 cable. VAST opens its capture buffer, and you then enter the appropriate commands on the other machine in order to send a stream of bytes to VAST. When all bytes have been sent, you assign the new data a frame number and VAST inserts it into the currently open database. Since I only had one micro in my office, I couldn’t test this feature.

Data from a remote NAPLPS database, such as Grassroots, can also be captured with VAST. This requires two asynch ports: one connected to your modem, and another to your decoder. When you start, VAST lets you dial a phone number from your PC keyboard. As soon as you connect, VAST begins passing all remote input to the decoder and requires that all local input come from the decoder’s keypad. You are now using your decoder to talk to the remote database, though all data passes through the PC as well. VAST buffers all bytes that flow into the PC. At any time you can enter a simple command on the decoder keypad which VAST will intercept and interpret as a command to write all buffered data into a frame and to empty the capture buffer. The program is amusing and easy, and I captured 10 frames from Grassroots in just a few minutes.

Once your database contains frames, you can set up the relationships between



them. You can specify, for example, that pressing the 3 key while displaying frame 27 should jump the user to frame 45. Or you might define the less than (<) key to mean "go to the previously accessed page." VAST offers an unusually rich repertoire of key definitions, and you can create a large database of almost limitless complexity. Fortunately, the screen display that prompts you for this linking information is marvelously clear. I had no trouble setting up all kinds of cross references between frames. And VAST will display on your screen or in a printout a nicely formatted table for each frame, describing the definition of each keypad key with respect to that frame.

Other than the problems mentioned earlier (no access to DOS files and no tutorial), the only other serious problem is VAST's inability to log user activity.

When VAST is used for business presentations, it may not be important to know how many times and when each frame was accessed. But whenever VAST is used to display advertisements, both the advertis-

The screen display that prompts you for linking database information is marvelously clear.

ers and the system operator need to measure usage. It would be a more useful product if it kept a constant disk-based log of all activity.

I have yet not been able to test VAST's performance on large databases since Tay-

son's review copy intentionally limited me to one database with no more than 15 different pages. Otherwise, the version that I tested was a fully functional single-user system.

Tayson also offers upgrades for two to eight users. The simplest form of two-user system simply requires two asynch ports, decoders, and monitors. Both users must access the same database, though they can display pages independently. With the addition of MultiLink software and a Hostess 8-port expansion card, Tayson claims VAST will handle up to eight independent users, each of whom can access a separate database. None of the multiuser configurations were tested. ■

David McCune is president of The Proteus Group, Inc., a New York videotex consulting firm.

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CIRCLE 342 ON READER SERVICE CARD

IBM PC Software: the value of choosing



Shoes.

If they don't fit, they're not worth wearing.

Software programs.

If they don't fit, they're not worth using.

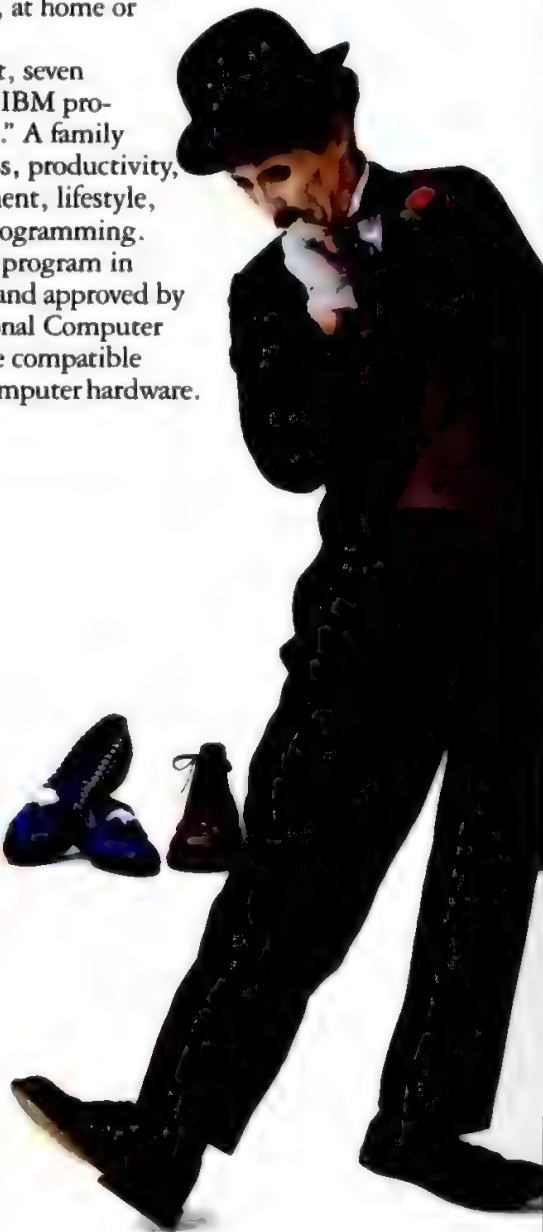
That's why it's altogether fitting that IBM Personal Computer Software offers you a choice.

Size up the selection.

You'll find many types of programs in the IBM software library. They'll help keep you on your toes in the office, at home or in school.

There are, in fact, seven different categories of IBM programs called "families." A family of software for business, productivity, education, entertainment, lifestyle, communications or programming.

Of course, every program in every family is tested and approved by IBM. And IBM Personal Computer Software is made to be compatible with IBM Personal Computer hardware.



programs that fit.

Putting your best foot forward.

Although every person isn't on equal footing when it comes to using personal computer software, there's something for almost everyone in the IBM software library.

For example, you may be on a shoestring budget and want a big selection of programs with small price tags.

You may be introducing students to computing and want programs that are simple to use and simple to learn.

You may run a business requiring sophisticated inventory and payroll programs. Or you may run a business requiring a single accounting program.

You may write interoffice memos and want a streamlined word processing program. Or you may be a novelist looking for a program with features worth writing home about.

Now you can find IBM Personal Computer Software that fits — to help you accomplish specific tasks and reach individual goals.

Stroll into a store today.

What's the next step?

Visit an authorized IBM Personal Computer dealer or IBM Product Center near you. To find out exactly where, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

Ask your dealer to demonstrate your choice of programs. Then get comfortable. Sit down at the keyboard and try IBM software on for size.

**IBM**

Personal Computer Software

Little Tramp character licensed by Bubbles Inc., s.a.

CIRCLE 136 ON READER SERVICE CARD



Getting Online for Education

Plato Homelink is an on-line database with an emphasis on education. It will turn your PC into a computerized tutor.

Having just finished several hours of computer-based instruction, I think it's appropriate to start this article with a short quiz.

Plato is

- (a) A series of educational programs available for some home computers, but not the IBM PC.
- (b) An on-line educational service aimed at universities and corporations.
- (c) An inexpensive general-interest on-line system available only to users of the IBM PC.
- (d) The name of an ancient Greek philosopher and teacher who knew nothing about computers.
- (e) All of the above.

The answer, of course, is (e), all of the above. Plato was originally developed at the University of Illinois as a combination of hardware and software for educational applications. Control Data Corporation acquired the rights to it, and eventually marketed the educational programs created for Plato as an on-line system to universities and businesses and on disks to microcomputer owners. Most recently, Plato has been adapted as an on-line system for the PC under the name Plato Homelink.

Plato Homelink Service is a new entry in the world of general-interest utilities, a kissing cousin to such better-known systems as Dow Jones News/Retrieval, The Source, and CompuServe. It is aimed pri-

PLATO HOMELINK

marily at the home market. The Plato educational programs are its central feature, but the system offers other services as well, including electronic mail, bulletin boards, graphics design, and text processing. One of Plato Homelink's best features is its graphics, which can be surprisingly detailed and in some cases even animated.

Three Hundred and Counting

Out of a total of about 1,200 Plato programs, roughly 300 are currently available through Plato Homelink, up from about 160 programs when the Homelink service first went on-line. More programs are being added as quickly as they can be revised to work with the PC. In the meantime, you should still find plenty here to keep you busy. The possibilities in purely educational programs range from grammar-school-level instruction in arithmetic, punctuation, and spelling to college-level instruction in psychology, computer science, macroeconomics, and population dynamics. Between these extremes you can find programs to help you brush up on your grammar and vocabulary or to teach you various aspects of geometry, algebra, chemistry, physics, or music. You will also find help on less academic subjects such as aviation ground school, nutrition, speed reading, and computer literacy. On a much less academic note, you will find games—30 of them, ranging from standard board games such as checkers and chess to common computer games such as

Plato Homelink Service

Control Data Publishing Co.

P.O. Box 261127

San Diego, CA 92126

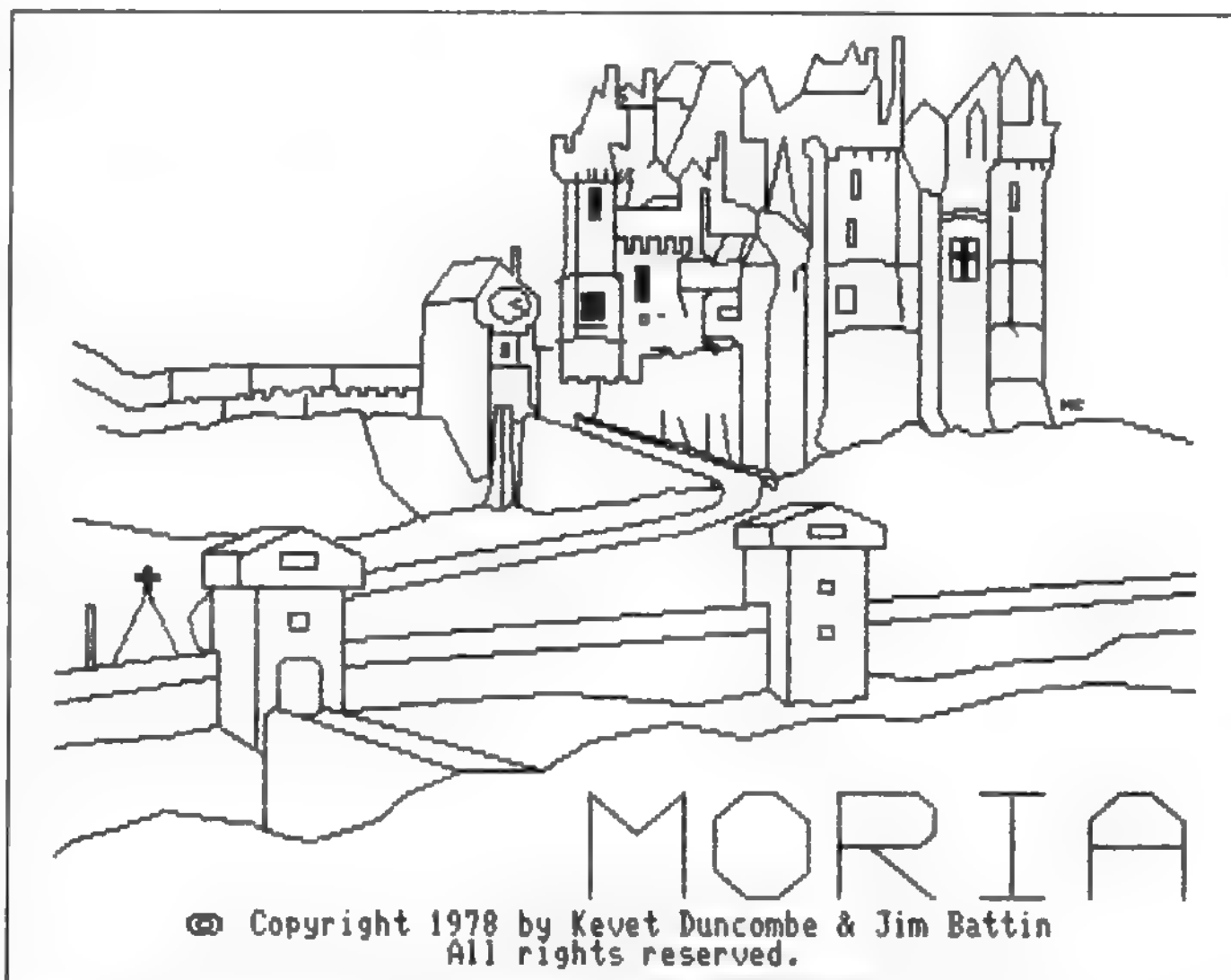
(800) 233-3784

(800) 233-3785 in California

List Price: Sign-up fee, \$50; yearly registration fee, \$10; on-line time, \$5 per hour.

Requires: 64K RAM, one disk drive, RS-232 interface with modem, color/graphics board.

CIRCLE 706 ON READER SERVICE CARD



"Moria" is a much-loved Plato game with wonderful graphics.

hangman and concentration. Plato Homelink also includes some unique and wonderful games like "Moria," a complex adventure game with graphics; and "Empire," a multiplayer game played against other Homelink subscribers and mediated by the Plato Homelink system.

Plato Homelink draws no clear-cut boundary between educational programs and game programs. Not only are all programs listed together in the system library in alphabetical order, but most game programs have at least some educational value, and many educational programs include elements of play.

A sword and sorcery adventure program like "Moria" is unquestionably a game, but it also qualifies as an extended course in problem solving. "High Wire," on the other hand, is a grammar-school-level educational program that teaches addition of fractions, but it is also a graphics-based game. The program presents you with a monkey hanging from a high wire and indicates its distance from a starting point in terms of fractions, perhaps $\frac{2}{8}$ or $\frac{5}{3}$. The challenge is to get a feather to

the monkey by adding the two fractions together. If you come up with the correct answer, you get to watch the feather move to the monkey. The monkey then falls to the ground, laughing "Hee, Hee, Hoo, Hoo, Ha, Ha."

Not all of the educational programs on Plato Homelink include elements of play or even make substantial use of graphics. The computer literacy program, for example, uses a great deal of text along with a few uninteresting boxes to represent concepts such as input, output, central processing unit, and memory. Overall, this program comes dangerously close to qualifying as a set of computerized flash cards. Even this program, though, provides a substantial amount of interaction in the learning process; it asks questions and forces you to answer before going on.

Exploring Plato

Like other general-interest utilities, Plato Homelink is divided into sections. The games and educational programs are all in the section called the Plato library. Two other important sections are called

Dungeons and Dragons

© Copyright 1982 by Norton Warner, All Rights Reserved

8 Current Adventurers

Press NEXT



The initial screen for "Dungeons and Dragons."

Text Processing and Graphics Design.

Text processing on Plato Homelink compares to a minimal and clumsy word processing program. It's certainly nothing to get excited about, but it does have one interesting capability that makes it worth mentioning. When you create a text file, you protect it with a code word, or password. If you give this code word to another Plato Homelink user, you can both get into the file to edit it or add to it as necessary. You can thus work on a file with a coauthor or editor even if the two of you are on opposite sides of the continent.

The text processor's possibilities are also limited severely by the Plato Homelink communications program, which will not let you send text files from your PC or save them on disk for further editing. You must create all files on Plato Homelink and save them on the Plato system. You can print a text file whenever you like, but only one screen at a time and only with an Epson printer equipped with a graphics package. The text processor is less a practical tool than an interesting possibility.

The graphics design section of Plato

Homelink is more promising, if only because you are less likely to have a decent graphics program on hand. A good

Plato Homelink's graphics can be surprisingly detailed and even animated.

graphics program should let you create simple shapes on command or draw more complex ones. It should also let you move your graphics around on the screen, change their sizes or colors, and generally manipulate your visual ideas as easily as a good word processor will let you manipulate text. Such programs for the PC are not widespread.

To draw a circle, for example, you simply mark the center and then move the cursor to mark a point on the circle itself. Once the system knows the center and the radius, it will draw the circle for you. Similarly, you can draw a rectangle by marking two diagonal corners.

There is also a large library of already existing graphics elements including things like bears, people, and trees. You can call these up as needed and use them for your own graphics.

Curiously, the graphics editor gives you more control over text than the text editor. Unfortunately, each graphics file is limited to only a single screenful of information, but pages can be linked to one another for presentations. As with text files, you cannot save graphics files on your own disks, but you can save them in the Plato system.

Plato Homelink also has a section labeled Electronic Mail. It includes both electronic mail, which Plato calls "pnotes," and bulletin boards, which Plato calls "notesfiles." Some current notesfiles are music, women's issues, sports, and gardening; there's also one for PC users. The usefulness of such communications services depends largely on how many people are on the system. Unfortunately, it's hard to come up with an accurate number of users. The bulletin boards are also open to users of the standard Plato service, including several universities. Control Data suggests 5,000 users as a minimum figure. This isn't much when compared to the tens of thousands of people on CompuServe or The Source, but that will change with time.

Plato's Classical Roots

It's important to understand the distinction between Plato and the Plato Homelink Service. Plato is a combination of hardware and software developed in the early 1960s on a mainframe computer. The project, headed by Dr. Donald Bitzer at the University of Illinois, was funded, in part, by a grant from the National Science Foundation and used hardware provided by Control Data Corporation.

The point of creating Plato was not simply to put educational programs on already existing equipment but to mold the computer into a better teaching machine, which meant designing new hardware as well as software. Dr. Bitzer and his team

PLATO HOMELINK

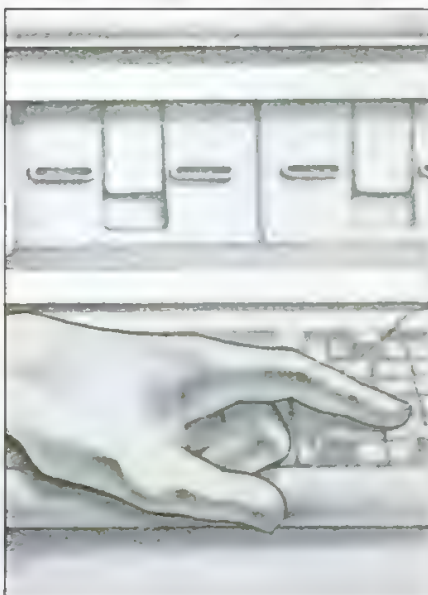
met this challenge by developing a dedicated "teaching" terminal that included appropriate help keys and function keys. They also developed a new programming language to create educational programs. Dr. Bitzer's design philosophy and educational approach are built into both the Plato Authoring Language and the Plato terminal.

Plato was originally used strictly at the University of Illinois, first on an experimental basis and then as an integral part of the curriculum. Early applications included instruction in music theory, chemistry, and psychology. In the mid-1960s, Control Data began using Plato to train managers and to provide an introduction to computers for first-time users.

In the mid-1970s, Control Data began marketing Plato as an on-line service to educational institutions and businesses. The cost of the service varied according to amount of use and the number of terminals needed, starting at several hundred dollars per month. In the late 1970s, Control Data introduced its own microcomputer and made Plato programs available on micros for the first time. In October 1982, some Plato lessons were made available on disk for a few additional microcomputers, not including the IBM PC. Plato was still distributed mainly through the on-line network, which was too expensive for individual use.

Finally, in July 1983, Control Data began testing the waters in the consumer telecommunications market by creating an after-hours version of the full Plato service and making it available evenings and weekends. This new system became Plato Homelink. Originally, the service was to be available through purchase of a Plato access disk. The name was quickly changed to the Plato Microlink disk; the name "Microlink" turned out to be trademarked by another company, so Control Data switched the name once again to Plato Homelink. You may run across references to this system elsewhere under any of these three names; be assured that they are all referring to the same thing.

By any name, Plato Homelink is a bargain as on-line systems go. The charge is only \$5 per hour with no monthly minimum, and a yearly \$10 registration fee covers the billing and handling charges on



Text processing on
Plato Homelink
resembles a
minimal and clumsy
word processing
program.

your account. A one-time \$50 sign-up fee buys you registration on the system, a password, the Plato Homelink disk, and a set of four or five pamphlets that Control Data passes off as instruction manuals.

These manuals are intended strictly as a minimal introduction to the system. Control Data opted to rely on on-line help rather than produce a comprehensive manual. The on-line help is usually sufficient, though it would be useful to have a printed course catalog with short descriptions of the available programs. Control Data claims that something of this sort is in the works.

Because it is tailored for a single on-

line system, the Plato Homelink disk gives you only one communications setting to worry about, the baud rate, or speed of communications. Unfortunately, the program does not include such simple amenities as automatic dial and log-on capabilities. It is currently being rewritten, though, and the next version will not only include these features but will function as a more generalized communications program. In the meantime, the program serves its most important function by giving the Plato system full screen control of your PC.

Most on-line utilities and communications programs use a fairly primitive approach to communications. They control your system one line at a time, effectively turning your computer into a glass teletypewriter. If you are entering text, for instance, the system will let you move the cursor around and make changes within any given line, but it won't let you back up easily and make corrections in earlier lines. Full screen control is what you'd expect from a word processor. You can move the cursor anywhere on the screen and make any changes you like. (Ironically, only Plato's text processing program functions on a one-line-at-a-time basis.)

On-line utilities can be designed to control a terminal on a full-screen basis, but most utilities opt for minimal communications capabilities with the largest possible range of equipment.

"Closed" systems like the standard Plato network don't have this problem. Until Plato Homelink went on-line, Plato was used exclusively with dedicated terminals, all of which have the same screen control codes. In addition to what full-screen control can do for text editing, it opens up other possibilities, such as the graphics and animation capabilities that are an integral part of Plato.

Dedicated PCs

The Plato Homelink disk makes your PC act like a dedicated Plato terminal, with two important differences. The major difference is that dedicated Plato terminals

Notes From a Plato Fan

An old admirer of Plato steps you through its menus and points out his favorite stops along the way.

When I first met Plato, I was a student at the University of Illinois. It was a firm friendship from the start. Not only could Plato help me with my studies, it could play games with me as well.

I said goodbye to Plato when I graduated from school. I didn't expect to see it ever again, because special terminals were required to gain access to its marvelous capabilities. But Plato is back, the PC's got it, and I'm pleased to see that it's as friendly as ever.

When you dial up Plato, you gain access to a host of services. Some are comparable to services offered by CompuServe and The Source; the two factors that set Plato apart from other on-line services are its emphasis on education and its extensive use of graphics.

The first thing you'll see after you call up Plato is its sign-on screen (Figure 1). You'll immediately notice some of the graphics that are used throughout the system. A prompt asks you to type your Plato name, and after you log on the Homelink menu will appear (Figure 2). You'll see a list of options as well as more examples of graphics.

If you choose option e, for Plato Programs, you get the Plato Homelink Catalog (Figure 3), which contains 273 programs broken down into 26 categories. There are lessons of all kinds, from astronomy to veterinary medicine. Exploring the catalog can be a challenge in itself—the list of programs goes on and on. Figure 4 is a partial listing of the programs available in just one section, Elementary Mathematics.

The games available on Plato Home-

(continued)

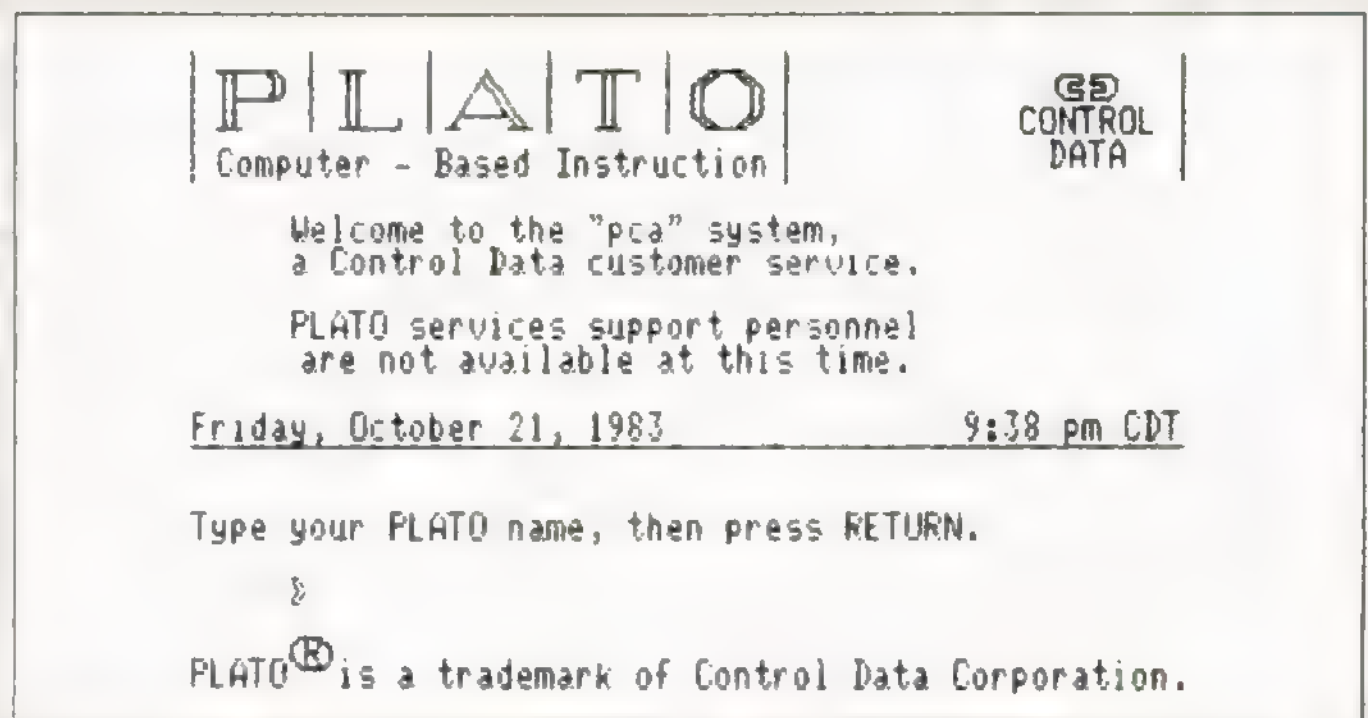


Figure 1: Plato's sign-on screen gives you a sneak preview of some of the many graphics that await you.

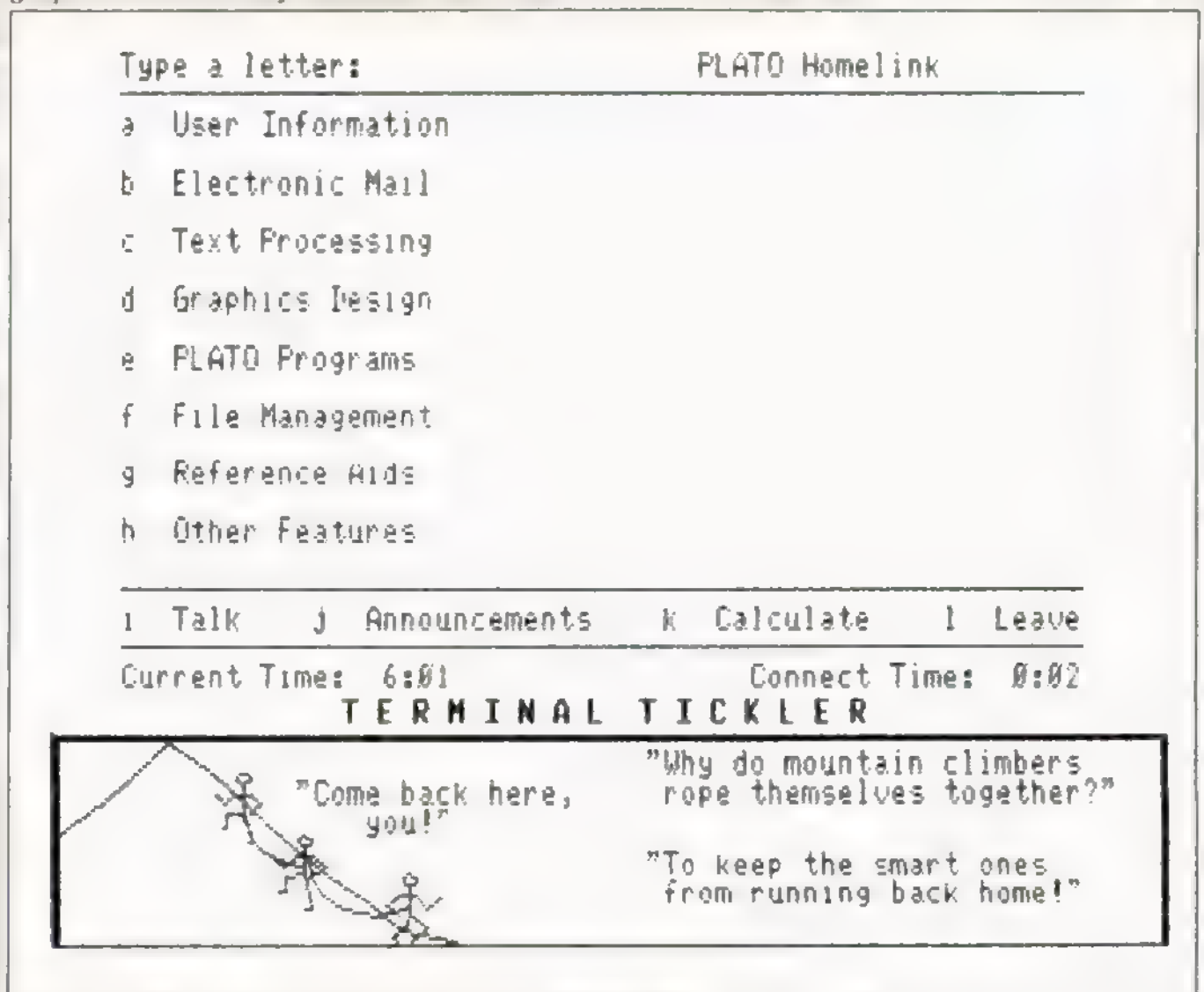


Figure 2: Once you have logged on, the main menu appears. Most of the options lead you to submenus.

EMPIRE

Total games since 01/07/83 = 178100
 Total users since 01/07/83 = 41917
 Average # users per day = 148

Number of people now in Empire (including you): 7

	PLAYERS	TOTAL WINS	MONTHLY
#Romulans	1	44	4
#Kazari	0	78	1
#Federation	4	185	11
#Orion	2	189	9

Universe Conquered 10/16/83 at 12.53.39.
 By: breslauer / iztsslj For: Federation

Please stand by while we beam you up, Captain....

Copyright © 1977, 1978 -- by Charles Miller & Gary Fritz

The initial screen for "Empire" offers little in the way of graphics but plenty of information for potential players.

have a higher resolution than the PC, dividing the screen into 512-by-512 picture elements, or pixels. The PC's resolution is 256-by-512. This doesn't usually create a problem, but there are some graphics in some Plato programs that are simply not suitable for the lower resolution of the PC.

The second difference is that Plato terminals have a touch-sensitive screen that lets users interact with the system simply by pointing and touching. This capability is used in different ways by different programs. The least inspired possibility is choosing the answer to a multiple-choice question by pointing to it. In a more interesting application, a program draws an image on the screen and the user either identifies different parts of the object by pointing to them or asks for more information about some part of the image by pointing to it.

In most cases, the absence of a touch-sensitive screen on the PC doesn't create a problem. Most programs will let you

either point by using a cursor and the arrow keys on your PC or type in answers at the keyboard. There are some Plato programs that do require the touch screen; those cannot be used on Plato Homelink with the PC.

The interactive aspect of the program typified by the touch screen is central to the concepts of programmed learning built into Plato. These same concepts were used in various electromechanical teaching machines, which were developed at about the same time as Plato—in the early 1960s. These teaching machines were extremely limited; they never worked very well and have since disappeared. Plato, being computer-based, does a far superior job.

Plato Homelink offers value for your money by turning your PC into a truly effective teaching machine. You get a personal tutor to help you in a wide range of subjects at a wide range of levels, all for only \$5 an hour. And that's certainly worth looking into. ■

(Plato Fan continued)

link are the most interesting part of the system to me. While I have nothing against Microsoft's *Flight Simulator*, the thrill of flying alone in your own little world pales alongside the challenges of Plato's "Airfight" game. "Airfight" lets you choose among 14 different jet

Plato Homelink Service is a kissing cousin to such systems as Dow Jones News/Retrieval, The Source, and CompuServe.

fighter aircraft, including the MIG-23 Foxbat and General Dynamic's F-16. Your opponents are people at other PCs or at Plato terminals; you have team mates to assist you. While the graphics aren't as good as *Flight Simulator*'s, it's more thrilling to pit your skill against another person than against a computer.

In other Plato games, players at different terminals form teams to explore dungeons, conquer galactic empires, or win World War III. With the computer acting as referee and players using their own skills to shape their destinies, the simulations can seem quite realistic. You haven't lived until you and six other Federation members have beaten the Romulans in "Empire." And Plato Homelink will give that opportunity.

Another popular service on most information utilities is one that connects two or more subscribers to each other for a conversation. Plato's Talkomatic feature goes beyond most other multiple-user conversation services I've seen, mainly because of its graphics capabilities and because it doesn't have to rely on a scrolling ASCII screen. Talkomatic allows each of five users to have up to four lines of conversation on the screen at the same time. It automatically locks each user's conversation into a particular piece of the screen so that the typed words don't encroach on another's area. With systems like CompuServe's CB channel, if you are typing your message on the screen and another user sends a message, your words are broken in half. Talkomatic, on the other hand, keeps everything separate and clear. You can access it from the main menu.

Old Friends

Plato has some nice features to help you save connect time while online. The keyboard is buffered so you can type ahead of the system. Full-screen menus will always appear, but if you know the letter or number of the option you want, simply key it in when the screen begins to appear. Plato will stop replotting the screen and begin executing your new command immediately. Most systems make you wait until the entire screen has been drawn before issuing commands.

It's always good to meet old friends again. Plato and I spent our first evening back together playing some of the old, familiar games. I was glad to see that my memories of previous good times we'd had were accurate in every detail.

—Christopher J. Novak

PLATO Microlink Catalog		Type a number:
LIST OF SUBJECTS		
1 Astronomy	14 Music	
2 Aviation	15 Nutrition	
3 Biology	16 Occult sciences	
4 Business	17 Physics	
5 Chemistry	18 Psychology	
6 Computer science	19 PLATO topics	
7 Consumer credit	20 Scheduling	
8 Demography	21 Simulations	
9 Games	22 Spelling	
10 Language	23 Stock markets	
11 Mathematics	24 Teaching	
12 Mathematics, elementary	25 Typing	
13 Medicine	26 Veterinary medicine	
»		
Press NEXT alone for main index.		

Figure 3: This is just one page of the subjects available when you choose the *e* option for Plato Programs.

PLATO Microlink Catalog		Press a letter:
Mathematics, elementary		FILENAME
a.	Adding and carrying	@zcarry
b.	Adding & subtracting using bills and checks	@bank
c.	Addition and subtraction of signed numbers	@post
d.	Addition by using an easier problem-1	@hs1
e.	Addition by using an easier problem-2	@hs2
f.	Addition by using an easier problem-3/4	@hs3p4
g.	Addition by using an easier problem-4	@hs4p
h.	Addition by using an easier problem, rev	@hsrev
i.	Ant hill (Intro. to signed numbers)	@ants
j.	Beehive	@bees
k.	Boxes: equivalent fractions	@recaq
l.	Candy factory	@candy
m.	Darts	@darts
n.	Decimal darts	@ddarts
o.	Equivalence experience	@sterms
p.	Equivalent fractions	@tryeq
q.	Equivalent fractions generalized	@egen
r.	Experimenting with hyperbolas	@hyper
s.	Experimenting with linear graphs	@grafeq
t.	Fractions basketball	@drib
^ Next Page v Beginning of List w Return to Index		

Figure 4: This submenu lists just some of the choices under the "Mathematics, Elementary" entry in the Plato Programs catalog.



Six Easy Pieces: Accounting Packages from IUS

With EasyBusiness Systems, your PC can process orders and generate reports faster than a speeding CPA.

Information Unlimited Software (IUS) is known to many for its family of *Easy* products such as *EasyWriter*, *EasyFiler*, and so on. It also markets an excellent set of *EasyBusiness Systems* accounting packages, which may fit your business accounting needs. If they do, you're in luck. You'll have at least one good alternative to consider if you're in the market for accounting software.

IUS has done its homework in developing accounting packages, or "modules," as they call them, which now include: *Order Entry*; *Accounts Receivable*; *Inventory Control and Analysis*; *Accounts Payable*; *Payroll*; and *General*

Ledger and Financial Reporter.

You can buy and use each of these packages separately. However, you should recognize that these application packages are neatly integrated, and taking advantage of all the features available in each package depends to a significant extent on your using one or more of the other IUS accounting packages. For example, you can use the *Order Entry* module alone to enter, manage, and report on your customer orders, but, without *Accounts Receivable*, you won't benefit from the special credit-checking routines available in the *Order Entry* module. Furthermore, without the *Inventory Control*

SIX EASY PIECES

and Analysis module, you won't be presented with all of the data pertaining to the availability of stock and potential item substitutions during the entering of an order. As a result, many people will want to purchase several of the modules. Each system can be fully integrated with the *General Ledger*, which automatically provides the transaction detail necessary to produce financial reports on the operation of the business.

The systems are compact and relatively fast, even when using floppy disks. If your data volumes are small, you could actually operate each of the individual systems on a dual floppy-disk system. Tables are supplied in the documentation to give you an indication of how many transactions could be stored, depending on the configuration you are using.

However, many businesses that will be using these packages will have transaction volumes that require a hard disk. We have installed or tested the IUS applications using the following configurations: IBM PC, Compaq, IBM PC-XT, IBM PC with a Tallgrass disk, IBM PC connected to a 3COM local area network, and IBM PC connected to an Orchid Technology PCnet.

The systems function well in each of these environments. However, you should be aware that when you purchase these systems you are buying a license to use them on a single machine—not on multi-

EasyBusiness Systems (Order Entry, Accounts Receivable, Inventory Control and Analysis, Accounts Payable, Payroll, and General Ledger and Financial Reporter)

Information Unlimited Software
2401 Marin Shipway
Sausalito, CA 94965
(415) 331-6700

List Price: Payroll module, \$745; other modules, \$595.

Requires: two 320K disk drives, or one 320K drive and a hard disk; 64K RAM.

CIRCLE 796 ON READER SERVICE CARD

Code	Description	Account	Dept.	Debit	Credit
Sale-a	Product A Sales	700			7,110.60
Sale-b	Product B Sales	701			3,865.50
Sale-c	Product C Sales	702			176.80
Fre	Freight Out	756			10.20
Tax	Sales Tax	516		11,365.40	202.30

Figure 1: A General Ledger Distribution Summary, such as this one from the Accounts Receivable Module, follows the last element of a financial report.

ple machines interconnected via network. IUS does have a discounted purchase arrangement available for those who might use their packages in a multiple-PC environment.

Setting up the Systems

The IUS accounting application packages are not difficult to learn to use once they have been set up for your business, especially when you consider how comprehensive they are. Unfortunately, sophistication in software often begets complexity. However, IUS has provided a solid set of documentation, a complete set of sample data, and a set of coordinated tutorials within the documentation that make it easy to "walk through" each system and learn by doing. It should take you no more than an hour to open up any of the application systems, make the necessary back-up copies, and begin to use the sample data that is provided to complement the tutorial exercises.

Make no mistake, however—these are full-fledged accounting systems. It will take you some time to set up any one of them and begin processing data for your company. Like any good application package, the IUS systems are quite flexible and offer you a number of ways to process and account for your business transactions (orders, invoices, or journals, for example).

Many of the decisions you'll make will come after you've used the sample data to learn how to use the system and you're ready to tailor it to your business needs. You'll want to make careful choices, since these decisions will determine how effectively the system will work for you. Many

of these decisions will require some knowledge of accounting or bookkeeping. For example, in setting up each application, the system provides a means for specifying which general ledger account codes are to be debited or credited to properly account for each transaction.

Here are some other examples of the kinds of things you'll be doing as you implement the systems:

- The IUS *General Ledger* provides a powerful means of doing some sophisticated financial reporting. However, this may require a revamping of your chart of accounts (something not uncommon when implementing a new automated system) in order to take advantage of the capabilities of the new system.

- The *Payroll* application is complete and affords you a great deal of flexibility in setting up the employee deductions and various withholding tax tables applicable to your locale.

- The IUS applications allow you to custom design many of your forms, such as picking tickets, invoices, order confirmations, and checks (many less sophisticated systems provide you with a set format for many of the forms they produce). This is an excellent feature, but it will take a little more time to install the system.

One real benefit is the Company Profile report that each application produces. This report is a summary of many of the options you have specified in tailoring the application to your needs.

Realizing that some of its customers will have questions when setting up their systems, IUS has set up a telephone support plan. Experts trained in the use of IUS systems are available to answer questions

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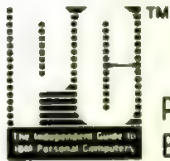


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over the telephone.

Anyone buying IUS software is provided with this service free of charge for 6 months. You can call between 9 a.m. and 4 p.m. PST weekdays. However, you can elect to subscribe to "EasyPhone Support" for 1 year at a cost of about 20 percent of the retail package price. As a subscriber to EasyPhone, you'll be able to use a toll-free number, you can call 7 a.m. to 5 p.m. PST weekdays or 8 a.m. to 4 p.m. Saturday, and you'll receive free program disk replacements and updates. We have used these phone-in services and have had no trouble reaching IUS representatives and getting answers to our questions. However, you should recognize that the company representatives are "expert" at installing and using their systems—don't assume they will know much about accounting for your business transactions.

Controlling Your Work

With any automated system, maintaining proper controls over the data is the only way to ensure the accuracy of the resulting financial information. There is simply no need to go through the effort and expense of implementing any business application only to have it produce data that lacks credibility. Furthermore, no automated system can ensure adequate controls are implemented; it can only facilitate adequate control by providing effective edits, appropriate error correction procedures, and a clear audit trail.

In their accounting series, IUS provides you with a good foundation to maintain adequate controls surrounding the processing of your financial information. The audit trail is very good, and so far we have encountered no processing errors.

One excellent feature found in many of the financial transaction listings is the General Ledger Distribution Summary, which follows as the last element of a financial report. For example, the Invoice Journal, a part of the *Accounts Receivable* module that lists financial data for each invoice, is followed by a summary like the one shown in Figure 1. Since this summa-

ry is part of the Invoice Journal itself, it helps you maintain an appropriate accounting audit trail.

Orders, Customers, and Inventory

Since they are so neatly integrated, I

will discuss the highlights of the *Order Entry*, *Accounts Receivable*, and *Inventory Control* applications as a group. These three modules focus upon meeting the needs of a typical wholesale or retail distribution business. Though you can certainly use them in a different fashion, Fig-

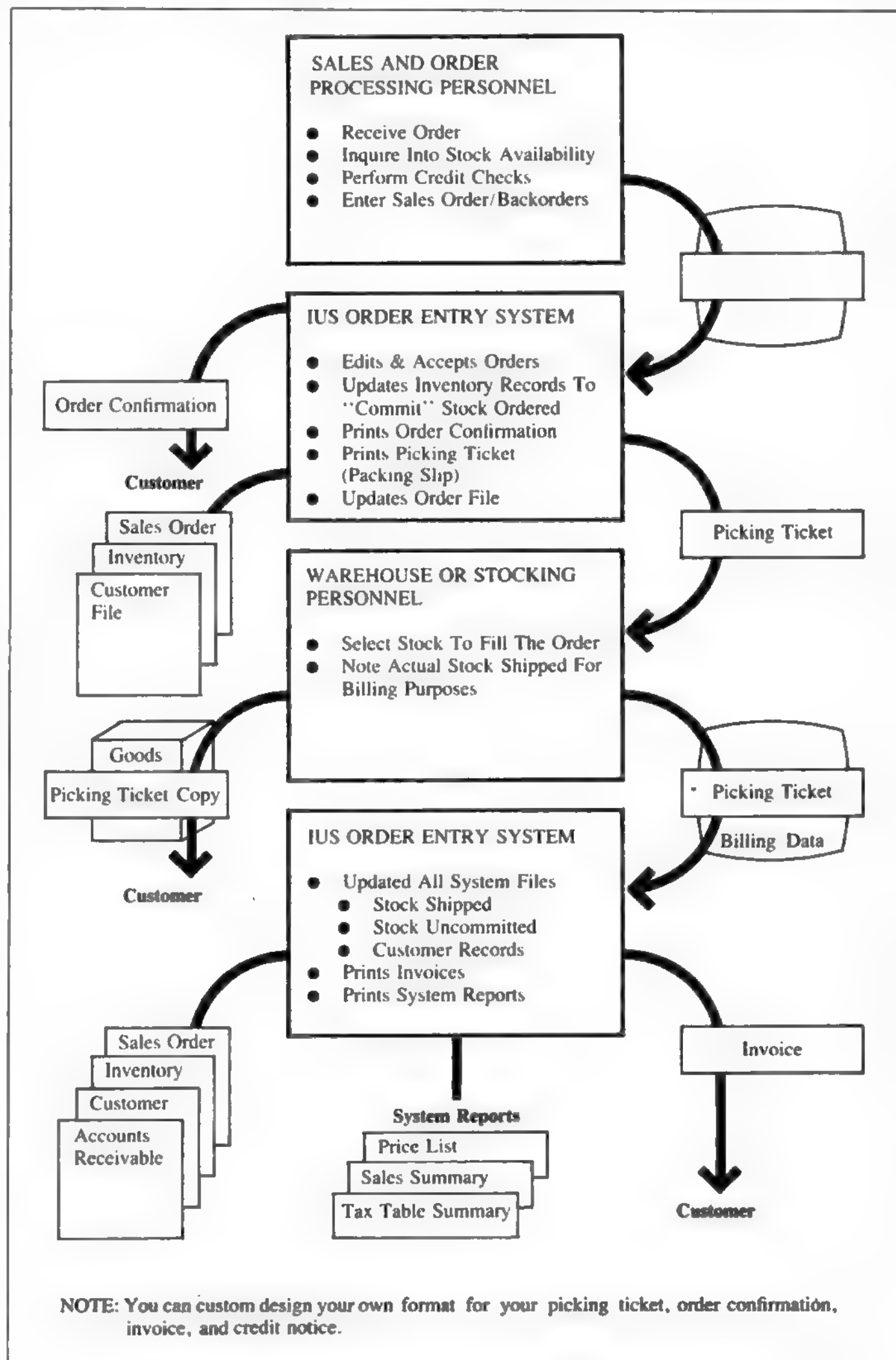


Figure 2: A typical sales order/billing process using the IUS Order Entry module.

SIX EASY PIECES

ure 2 shows the general process that the *Order Entry* package follows to help you manage and account for your business.

Orders are received, entered, and managed using screens like those accompanying this review. Once entered, you can print and send to your customer an order confirmation. You can also print a picking ticket (or packing slip) to be used to select the ordered goods and to note any "stock-outs" or short shipments if stock is not available to complete the order.

Picking tickets can then be used to perform the billing or invoicing process. You use the outstanding orders (modified appropriately) as the basis for invoicing the customer and recording any necessary back orders. During the entry or modification of an order and during the invoicing process, the order, customer, accounts receivable, and inventory files are all updated appropriately to reflect the ordering and subsequent shipment of goods. Some of the outstanding features in these modules are order maintenance, discount pricing, custom inventory item number format, inventory categories, and costing of inventory receipts.

Order maintenance. The *Order Entry* system helps you enter and organize outstanding orders. You can classify orders as active, standing, future, on hold, or as back orders.

An active order is one that is entered as an outstanding order to be filled and processed normally. The system "tracks" an order through five possible statuses: an active order (just entered), order confirmation printed, picking ticket printed, invoice entered (that is, shipment of goods confirmed), and invoice printed.

Standing orders can be used for customers who regularly order the same items and item quantities. A standing order will allow you to enter an order once and then simply recall it each time the customer places the same (or similar) order without having to reenter the details. The standing order becomes, in essence, a "template" for an active order.

Future orders are orders that customers

want filled at some future date. Future orders are, in effect, memo orders in that they do not affect quantities in the inventory file. Say that one of your customers requests that you ship 100 units of a given item each month for the next year. You could set up 11 future orders and one active order. Each month, you would simply have to "activate" one of the future orders and process it normally.

An order can be put "on hold," which is simply a convenient way of keeping track of an order that the company does not want to process at the time it is entered. This feature allows you to enter

orders for new customers and then delay processing until they have received credit approval.

Back orders are, of course, orders that cannot be filled from inventory on hand and, thus, must remain on file pending arrival of new stock. Back orders can be established when originally entering a customer's order (when, if you are using the Inventory system, you should know whether or not there is sufficient stock to fill the order) or during invoicing (presumably after it's been discovered that there isn't sufficient stock to fill the order).

Discount pricing. Flexibility in pricing

New to PC: The Price Waterhouse Report

In this review series, learn how Price Waterhouse rates some of the best available accounting packages.

The accompanying review is the first of 12 monthly articles in which we at Price Waterhouse examine and review PC-based accounting software. Our goal will be to provide *PC* readers with relevant and timely reviews of some of the better accounting system packages available today.

Price Waterhouse (known to many through our involvement with the Academy Awards) is an international public accounting firm with offices in 84 cities across the United States. We provide accounting and auditing, tax consulting, and a variety of management consulting services to a broad range of public and private sector clients. Our clients range from very small companies to very large corporations.

In this series of articles, we'll review all sorts of accounting software—some large systems, some small, but all worthy of your consideration. Not all will be general accounting systems like the IUS applications reviewed this month. We'll also review packages developed for certain industries.

The accounting system reviews will

be carried out and written by partners and staff from two Price Waterhouse offices—one in New York City and one in Sacramento, California. Those reviewing the software will be members of our Management Advisory Services (consulting) staff. All are data processing professionals, and many are CPAs, as well. Whenever possible, the articles will be written by individuals who have actually implemented the accounting systems discussed, not just performed a review using test data. We've completed, or are now performing, in-depth reviews of over 20 PC-based accounting systems. We'll try to select the best and most unique systems for this series.

We will focus our comments on those aspects that make a given accounting software package unique. We're not going to waste your time or ours reviewing what we believe to be poor systems. However, along with the praise, we'll try to point out a package's limitations, and we'll even point out how you might get around them.—**J.D. Harris**, Price Waterhouse New York; **G.W. Dauphinais**, Price Waterhouse Sacramento.

SIX EASY PIECES

is a requirement in many companies. The IUS packages provide a flexible yet controlled means of establishing base prices and appropriate discounts. You can establish a base price for each inventory item. In addition, you can specify up to five levels of discount pricing for each item. These discounts are identified by discount codes—A, B, C, D, and E. So, when entering an order, you need only enter the appropriate discount code, and the system will automatically calculate the discounted price. You can even specify, when setting up a system, that the resulting discounted price is to be rounded up or down—say, to the nearest 5 or 50 cents. You can assign each customer a “default” discount code, which will automatically enter discount prices when orders for this customer are processed. You can, of course, override the discounted price when entering an order for any item. (This is a necessary convenience; however, it would have been even better if the system had been set up to allow you to override the discount percent and have it recalculate the price.) As a means of improving your control over pricing, the system will highlight with an asterisk (*) any order line for which a price other than the standard base price has been entered.

Custom inventory item number format. One of the more impressive features of the IUS modules that deal with inventory items is the latitude they provide for “structuring” the inventory item (or part) number format. Once the structure or form of a company’s item codes is established (during system initialization), the IUS applications will use the stated format for capturing and editing item numbers and for displaying them. More importantly, you can instruct the system to use the first two characters of an item code as a “category” code for inventory reporting purposes.

An item number can have from one to four “segments,” which are divided by special characters as shown in Figure 3.

Segments of up to 16 characters each are separated by single special characters:

```

Order Processing - ACTIVE ORDERS
Order No. [ 1000 ] Active Order
Customer No. [ 200 ] Name [Mr. Ronald Black] Total: $ 854.85
Line No. [ 1 ]
Or Item Number [A1-103/0]

[Flourescent Desk Lamp]
[ 4 ] EA
3 Price /1 [B] [ 33.75 ]
Extended Price [ 135.00 ]
Qty. Backordered [0]
4 Ship From [1]

-----
LOCATION 1 + LOCATION 2 = ON HAND
63 0 63
COMMITTED On B/O On P/O
4 0 0
Disc% 0.00 Base Price: 33.75
Alt. Item: A1-310/0
P/O Remarks:

-----
Item Number Qty. Ordered Qty. Backordered Extended Price
1) A1-103/0 4 0 135.00

Press ESCAPE for next line, (E/D) for EDIT or DELETE line?
  
```

Order Processing Screen

1. Two item description lines are available: the first comes from the inventory file; the second lets you further describe the product.
2. Quantities available at Locations 1 and 2 are displayed, as well as quantities committed, on backorder, and on purchase order for this item.
3. This price is at discount level “B” from the base price (in this case, zero percent of \$33.75).
4. You can specify which location the goods should be shipped from.

a period, slash, hyphen, parentheses, number sign, or a blank. You may also choose to use one of these characters as a prefix or a suffix to the item number. After

The IUS General
Ledger system is
truly one of the
better offerings on
the market today.

the structure has been established, the systems will automatically insert the characters in the proper location. You needn’t type them. For example, if you choose a three-segment number such as XX-XXX/X, and you want to type in the item number F1-502/B, you would only have to enter the characters F1502B.

You may choose to keep the system simple and have only one item number segment. However, it is often advantageous to segment the item number, which

will provide for better reporting and will make the item numbers more significant to those using the automated system.

Inventory Categories. The IUS *Inventory* module gives you the ability to set up inventory categories. This facility enables you to more precisely account for the profit earned in selling different lines of products. With each two-character category, you can associate a 30-character description and specific general ledger chart-of-accounts codes for sales revenue and cost of goods sold postings to the general ledger. This can provide a powerful means of analyzing the profitability of marketing various product lines. It gives a small entrepreneur a reporting capability often found only in larger companies.

If profitability by product line is not needed, the product category codes for each sale can be used to segregate reporting of gross profits by cost center or department. Several of the inventory reports allow you to print out subtotals for each category.

There is one limitation in this facility.

SIX EASY PIECES

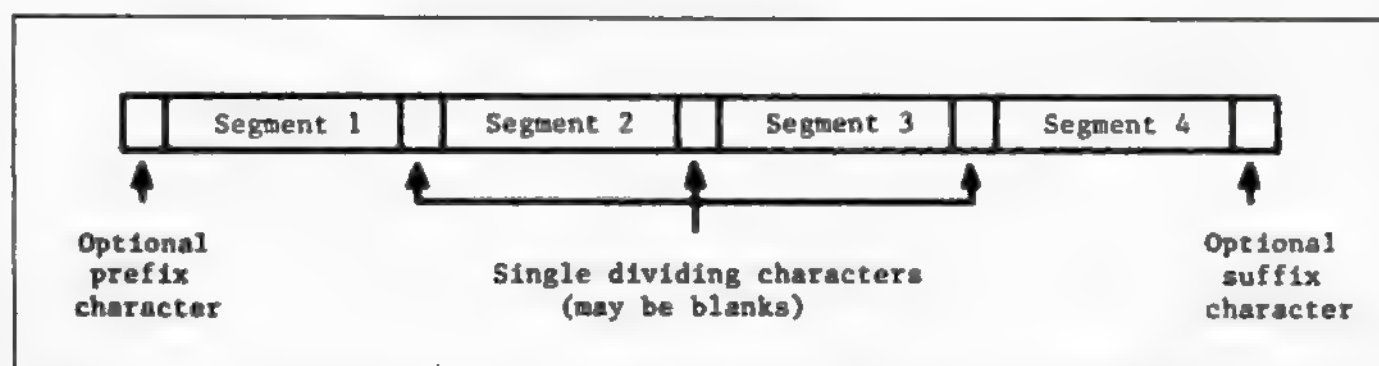


Figure 3: You can customize inventory item numbers using this format, which allows up to 16 characters per segment.

Even though you can set up well over 100 different category codes in the *Order Entry* module, the *Accounts Receivable* module limits you to 20 account/department distributions. Thus, you can only really segregate, for financial reporting purposes, 20 different categories.

Costing of inventory receipts. Few microcomputer-based inventory systems offer the flexibility in costing inventory receipts that is available in the IUS package. For example, many distribution businesses incur certain "extra" charges in purchasing and receiving a group of goods to be inventoried for later sale. Sales tax and freight are examples of these extra charges. If a variety of items are received,

and these extra charges apply to the entire lot, most micro-based inventory systems will force you to prorate these charges

The Financial Reporter allows you to produce some very effective special reports.

yourself and then manually allocate them over the lot. The IUS *Inventory* system automates this process: You enter the total of extra charges, and the system automat-

ically prorates them over the items received.

General Ledger and Payroll

The heart of any business accounting system is its general ledger, and the IUS *General Ledger* system is truly one of the better offerings on the market today. It provides 12 characters to create chart-of-accounts codes—six for the actual account code (often called the "natural" or "object" code) and six for a department code. You can choose not to use a department code if you wish, and you need only use the number of characters necessary for your chart of accounts. You can accumulate and report net balances of all transactions for up to 24 months of actual data and up to 12 months of budget data for each general ledger account.

In its *General Ledger* package, IUS provides a sophisticated (but complicated) report writing capability—the Financial Reporter. This provides an excellent means of extracting information from the general ledger (drawing data from the actual or budgeted amounts) for creating reports in a manner that makes the most sense for your business. A common application of this feature would be to develop a report that lists, in column format, actual amounts, budgeted amounts, and variance.

This system is quite flexible. It allows you to: define where you want which columns of data; to place text (notes, etc.) anywhere in a report; and to define calculations, such as the difference between two columns, or one column as a percentage of another or as a percentage of a column total.

The good news is that the system allows you to produce some very effective special reports—statements that show gross profit by product line or by department, schedules listing expenses by department, and the like. The other news is that with the Financial Reporter's sophistication, there comes a certain level of complexity. You will have to learn a set of somewhat cryptic "statement specifica-

THE UNIVERSAL CORPORATION Customer Inquiry

Date: Dec 25 83

```
Customer Number [ 200 ]
Name [Mr. Ronald Black ]
Short Name [Mr. R ]
Address 1 [2820 Wabash Road ]
Address 2 [Los Angeles, CA ]
Address 3 [ ]
Zip Code [90048 ] Phone [(213)-786-0274]
Contact [Mr. Black ] Salesman [SP ]
Credit Limit ($) [2000 ]
Receivables Bal. [ 1,123.65 ]
Sales YTD [ 1,236.95 ], Last Year [ 0.00 ]
Last Invoice Date [11/10/80], Amount [ 864.90 ]
Last Payment Date [11/15/80], Amount [ 100.00 ]
```

```
1 Territory [W ] Tax Status [1] 3
2 Customer Type [B] Exemption 1 [ ]
Invoice Terms [Net 30 ] Exemption 2 [ ]
```

Press RETURN for Next Customer, otherwise ESCAPE

Customer Inquiry Screen

1. Specifying the territory in the customer file is a convenient way to tally sales by territory. The *Order Entry* package can then print reports summarizing sales activity in each territory.
2. The "Customer Type" field lets you specify a discount level for each customer. Orders for this customer will automatically receive a "b" discount.
3. The system allows ten levels of sales tax, coded 0 through 9. When setting up the system, you may specify 0 as "nontaxable" and then assign tax levels for 1 through 9.

SIX EASY PIECES

tions," which you use to dictate the format and content of the report. Learning these specifications is similar to learning a new word processing system. For those of our clients using the IUS *General Ledger*, learning how to use this capability has proven well worth their effort, but you should anticipate a learning time of 4 to 8 hours.

The IUS *Payroll* module was released in late 1983, so we have much less experience with it than with the other IUS applications, which have been on the market for some time. We are now helping two clients implement the *Payroll* application, and it appears very comprehensive. IUS has maintained its standards in developing this system. There are two significant limitations: The payroll master file (for any one company) is limited to a maximum of 300 employees, and for labor distribution purposes, you are limited to a maximum of 12 departments to which labor costs can be allocated.

Applying the IUS Applications

The IUS accounting packages have wide applicability. Certainly, the *General Ledger* module could be used in most small businesses. However, as you would expect, their features will meet the needs of certain businesses better than others.

What are the drawbacks of these programs? Well, for starters, they have no job cost capabilities. A meaningful job cost application needs to be an integral part of the payroll and accounts payable systems—this is not the case with the IUS systems. Whereas the features of the *Order Entry* module can accommodate the needs of many wholesale and retail distribution businesses, service businesses may not find them appropriate for their requirements. Also, certain manufacturing environments might find it difficult to live with the limited labor distribution capability of the *Payroll* module.

These relatively sophisticated systems will not satisfy everyone's needs. Any set of applications that tried to cover "all the bases" would be so cluttered with features

THE UNIVERSAL CORPORATION Item Inquiry

Date: Dec 25 83

```

1 Item Number      [S1-300/Y]
  Description      [Curved Screen 5'H x 6'W ]
  Unit of Measure  [EA]
2 Base Price       [          244.95 ] Per [1   ]
  Tax Status       [1]
3 Picking Sequence [0056]
  Alternate Item No. [S1-300/W]
  Remarks          [
Discount %         A. [ 2.00] B. [ 2.00] C. [ 2.00 ] D. [ 0.00] E. [ 0.00]
4 Vendor Number    [450]
  Vendor Name      [Master's & Co.   ]
  Vendor Item Number [300/Y          ]
  Backup Vendor Name [Arrow Screens  ]
  P/O Remarks      [confirmed for Nov 26]
  Total: On Hand [          50 ], Moving Average Cost [          8,511.00]
  
```

Press RETURN for Next Item, otherwise ESCAPE.

Item Inquiry Screen

1. This item number is in three "segments." The first two characters can also specify the product category.
2. Unit of valuation can be any number from 1 to 65,000. This allows you to have an item with a unit of measure of "each" but to price it at, say, \$20 per dozen.
3. Picking sequence numbers can be used to print "bin/shelf" labels to identify the location of inventory items. This number can also be used to determine the order in which items appear on the Order Picking Lists.
4. You can specify a regular vendor and an alternate (backup) vendor for each item.

it would probably be of little use to anyone. However, as your use of automated business systems matures, you will prob-

The IUS accounting
packages are
among the best on
the market today.

ably discover the need to manipulate data contained within the systems in a manner that is not provided for by the package. A convenient feature of any system is the ability to "import" or "export" data to or from the system's files. This is not provided for by the IUS applications. This is an unfortunate shortcoming, and, for us, was so important a feature that we wrote our own (BASIC) programs to examine the IUS files, decode their data formats, and create files which we can then access with systems like Lotus' *1-2-3* and *dBASE II*. It's proven quite useful. We have also developed programs necessary to create "batches" of accounting transactions to

submit to the IUS *General Ledger* system.

Future Enhancements

IUS has announced a new windowing capability called EasyPlus, which it claims will allow you to integrate its full line of IUS productivity and accounting applications. This facility is scheduled for release later this spring. It will support concurrent processing of up to ten applications, each using a different overlapping window. Take a look at this capability when it's released. If the company can deliver on the promises made in its promotional literature, EasyPlus will indeed be an exciting and useful enhancement.

The IUS accounting packages are among the best on the market today. If their features match the data processing needs of your business, have a look at them. And have a look at others. Compare them feature by feature in light of your business needs. With the increasing sophistication of PC-based accounting systems (IUS and others), you'll wind up a winner.—G. William Dauphinais

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CIRCLE 391 ON READER SERVICE CARD

Working With Graphics Characters

With BASIC, you can write your own graphics programs by using a simple set of ASCII codes that create a variety of symbols, lines, and boxes for drawing graphs.

This is the second in a series of excerpts from the book *BASIC Primer for the IBM PC* by Bernd Enders and Bob Petersen, designed to help our readers use BASIC for the PC. Reproduced with permission from the copyright owners, the book will be published by The New American Library under the Plume/Waite imprint, copyright © 1984 Waite Group, Inc., San Rafael, California. All rights reserved. This chapter explains the use of ASCII codes to create character graphics such as unusual symbols and boxes.

BASIC Primer for the IBM PC
Bernd Enders and Bob Petersen
(The New American Library, Inc. New York,
forthcoming) Softcover, \$17.95

One of the truly outstanding features of IBM PC BASIC is its ability to produce high-quality graphics with relative ease. By graphics we mean any kind of visually meaningful display of information, such as a picture, a game-related image, a graph, or the use of what are called special characters. This chapter is about a particular kind of graphics called *character graphics* that you can do on either of the two most common display systems available—the IBM Monochrome Display (with the Parallel Printer Adapter) and any type of monitor driven by the Color/Graphics Monitor Adapter.

Have you ever looked very closely at a photograph in a newspaper, book, or magazine with a magnifying glass? Nothing but tiny dots! Some of these dots are bigger than others, but they're all black. An area that has lots of large black dots

GRAPHICS CHARACTERS

appears darker than an area that has small black dots. Thousands of these black dots (on a white background) make up a complete, recognizable image.

An image on your screen is produced by a similar matrix (or grid) of dots, although the dots on your monitor screen can only be "on" or "off." (There are actually two levels of being "on," but for simplicity's sake we will not discuss these levels here.) All text or all pictures on your IBM PC are produced by such a matrix of dots or *pixels*, as they are formally called.

When you first turn on your computer, it defaults (goes into a certain mode or state on its own unless you tell it otherwise) to the text mode. In the text mode, pixels can't be turned on and off independently of each other. Instead, pixels are organized into units called *character spaces*. On your IBM Monochrome Display, each character space requires 14 rows and 9 columns of pixels—a total of 126 pixels! Your whole screen, on the other hand, can have 80 columns and 25 rows of characters. Pressing the A key, for example, causes a specific set of dots to turn on that give the correct appearance of the letter A. Figure 1 shows the relationship between your screen, the character spaces, and the letter A that is produced by dots within a character space.

In text mode, any kind of picture or graph we want to "draw" has to be constructed out of whole characters. Although your keyboard has a lot of characters, most of them aren't very useful for drawing pictures or graphs. IBM PC BASIC does, however, provide us with an extension of the keyboard that gives us a large variety of special characters, many of which are specifically designed for graphics applications. This keyboard extension is embedded in what is called the ASCII character code.

The ASCII Character Set

ASCII is an acronym for American Standard Code of Information Interchange. It's a code that associates a character with a particular number or value. It originated out of the need for different teletyping stations to "talk" to each other. The problem is similar to that faced by a group of people who all speak different languages. The solution to both problems is obvious (even if not so easily accepted by everyone): agree on a common language or a code. Although today ASCII is primarily used in communications between computers, it is also used frequently to make available a larger selection of symbols or characters than is possible by means of the usual typewriter keyboard. It is this latter use—the keyboard extension—that is of interest to us now.

There are two ways to access or to explore ASCII. The first

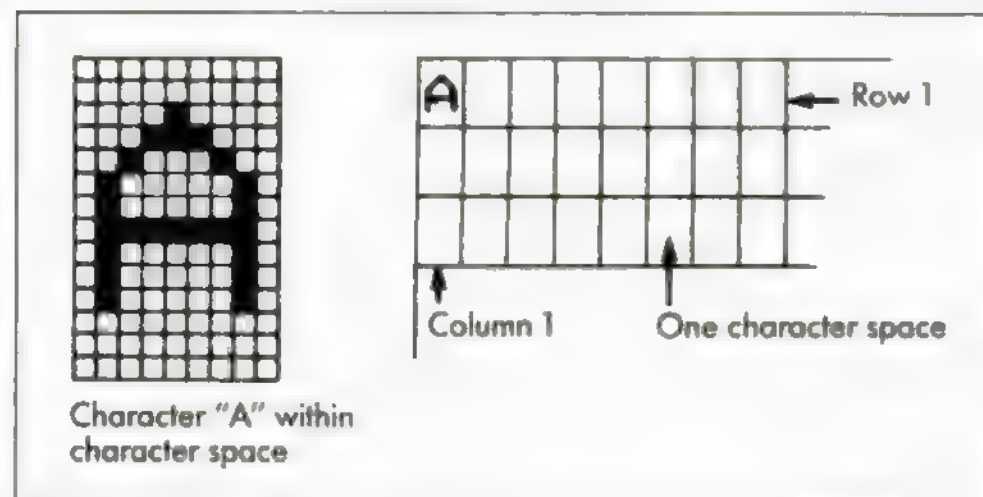


Figure 1: Formation of characters on your monochrome screen.

ASCII Code	ASCII Character	Comments
2	zilh, nothing!	Codes 0-31 don't return visible characters but computer BEEPs
7	zilh, nothing!	
35	#	Digits 0-9 have codes 48-57
53	5	
65	A	Uppercase letters codes 65-90
107	k	Lowercase letters codes 97-122
132	a with umlaut	You can write German with it
217	┘	A corner one of many graphic characters
251	√	Square root sign

Figure 2: A selection of ASCII characters and their corresponding code values.

is by using the Alt key, and the second is by means of the special translating function CHR\$.

The Alt (for alternate) key is on the lower left of your keyboard. Its purpose is to alter the usual function of your keyboard keys. If you press it by itself, nothing happens—go ahead and try it. But if you hold it down while you also press another character key, you'll get some interesting results. If you try this with the letter p, the word PRINT will appear on your screen instead of the letter p. Thus the Alt key pressed in combination with a letter key returns one of the most commonly used BASIC words. This feature of IBM BASIC is a very handy time-saver. This time, though, let's hold down Alt while pressing a number, say 65; more precisely, press and continue to hold down the Alt key while you press 6 and then 5. Nothing happens as you type the digits 6 and 5, but the instant you release the Alt key, the letter A appears on your screen! What have you done? You've entered the ASCII code value 65, and the computer returned the corresponding ASCII character, an A. In other words, holding down the Alt key while typing 65 (ASCII code for A), and then releasing the Alt key returns the corresponding ASCII character A. IBM has supplied us with a total of 256 ASCII characters that have code values of 0 to 255. To get an idea what's in this character set, try a few more code numbers. Figure 2 shows a selection of

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some ASCII codes and their corresponding characters.

We'd like to make a few remarks about the samples in Figure 2. Codes 0 to 31 don't return characters on your screen if entered with the Alt key. These codes are reserved for special

One way to translate ASCII codes into characters is by means of a BASIC function made for this purpose.

communication instructions between computers and computer peripherals. For example, ASCII code 13 means "do a carriage return."

Codes 32 to 126 include all the standard keyboard characters. Code 127 is another communications instruction meaning "delete." Codes 0 to 127 are considered the really standard ASCII codes. Most computers use them internally as well as for communications with other computers and related devices.

All the codes from 127 to 255 are IBM's own embellishment of ASCII. Among them are foreign language characters (like the letter *a* with an umlaut), mathematical symbols (like the square root sign), and a large variety of graphics characters. This chapter is primarily about the use of these graphics characters.

Before we leave this topic of generating ASCII characters by means of the Alt key, we'd like to show you how you might use this technique to enter words in a foreign language. Here it goes:

```
10 INPUT WORDS
20 PRINT WORDS
30 END
Ok
RUN
? Hosenträger      ← a with umlaut is entered via
Hosenträger        [ALT] and 132 combination
Ok
```

The letter *a* (with umlaut) was entered by holding down Alt and typing 132. This special character is treated just like all the other characters in the entered string value.

The CHR\$ and ASC Functions

A generally more useful way to translate ASCII codes into characters is by means of a BASIC function designed just for

this purpose—CHR\$. (The word *function* generally refers to a procedure that returns a specific output for a given input.) While CHR\$ does almost the same thing as holding down Alt and pressing a number, it can be used within a BASIC program. Try this example:

```
10 PRINT CHR$ (217)
RUN
]
Ok
```

The number 217 inside the parentheses is the ASCII code for a corner graphics character. The function CHR\$ translates this code to a character value, which is then printed.

Another way CHR\$ can be used is illustrated by the following example:

```
10 X$ = CHR$(217)
20 PRINT X$
RUN
]
Ok
```

Here the string variable X\$ is assigned the value of the CHR\$ function, which is the ASCII character corresponding to the ASCII code 217. Note that CHR\$ returns a string value, so the variable to which you assign it must also be a string variable.

In addition, you should note that CHR\$ cannot be used all by itself. You must print it as shown in the first example (or use it with the LPRINT command to get printer output), or you can assign it to a string variable.

Let's use CHR\$ to write a program that prints the whole ASCII character set:

```
10 '---THE ASCII CHARACTER SET-----
20 FOR CODE = 0 TO 255
30   IF CODE >= 9 AND CODE <= 13 GOTO 50
40   PRINT CHR$(CODE) " ";
50 NEXT
60 END
```

The output is shown in Figure 3. There you have it—the whole IBM ASCII character set. But there are a few surprises, both in the program and the output. Let's first look at the program. Line 40 says "first print the character corresponding to the ASCII code number represented by the variable CODE and then print a blank." The purpose of the blank is to insert spaces between each of the characters in the output to make it more readable. The FOR-NEXT loop (lines 20 and 50) exe-

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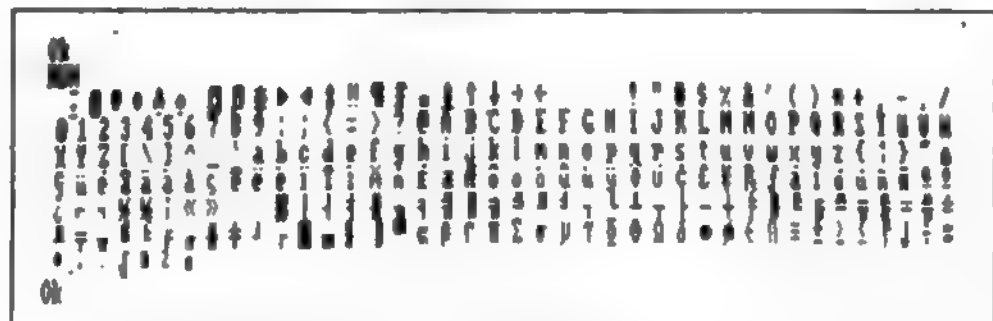


Figure 3: ASCII character set as printed out by the program.

ASCII value	Character	ASCII value	Character	ASCII value	Character	ASCII value	Character
128	Ç	160	à	192	Ł	224	α
129	ü	161	á	193	ł	225	β
130	é	162	â	194	Ł	226	γ
131	ô	163	ã	195	ł	227	δ
132	õ	164	ä	196	Ł	228	ε
133	ö	165	å	197	ł	229	ζ
134	ø	166	æ	198	Ł	230	η
135	ç	167	ö	199	ł	231	θ
136	è	168	ø	200	Ł	232	ι
137	é	169	ı	201	ł	233	ϑ
138	ê	170	ı	202	Ł	234	κ
139	ı	171	ı	203	ł	235	λ
140	ı	172	ı	204	Ł	236	μ
141	ı	173	ı	205	ł	237	ν
142	Ä	174	ı	206	Ł	238	ξ
143	Å	175	ı	207	ł	239	ο
144	É	176	ı	208	Ł	240	π
145	Ê	177	ı	209	ł	241	ρ
146	Ë	178	ı	210	Ł	242	σ
147	ô	179	ı	211	ł	243	τ
148	ö	180	ı	212	Ł	244	υ
149	ø	181	ı	213	ł	245	φ
150	ù	182	ı	214	Ł	246	χ
151	û	183	ı	215	ł	247	ψ
152	ü	184	ı	216	Ł	248	ω
153	Û	185	ı	217	ł	249	•
154	Ü	186	ı	218	Ł	250	•
155	ç	187	ı	219	•	251	•
156	è	188	ı	220	•	252	•
157	é	189	ı	221	•	253	•
158	ê	190	ı	222	•	254	•
159	ë	191	ı	223	•	255	(blank FF)

Figure 4: Special graphic characters.

cutes line 40 for all values of CODE from 0 to 255—except values 9 to 13. The IF-THEN statement in line 30 says “if CODE has a value between 9 and 13, then go to 50, the end of the loop—that is, bypass line 40. We want to bypass characters 9 to 13 because they wreak havoc with the program output: character 13 for example, causes a carriage return, which we clearly don’t want right in the middle of our neat rows of ASCII characters.

The output looks a bit familiar by now: It contains all the characters we generated with the Alt-number key combination we used previously. Surprisingly, however, it also includes a whole series of new characters corresponding to ASCII codes 0 to 31. These characters—for example, smiling faces, hearts, and musical notes—weren’t available to us using the Alt-number keys. Again, these are not standard ASCII, but the result of IBM’s inventiveness.

The CHR\$ function converts a number to its corresponding ASCII character. But sometimes the inverse function is needed; that is, you may need to convert a character to its ASCII code value. That task is performed by the ASC function. The following example illustrates one way to use ASC:

```
10 PRINT ASC("g")
RUN
103
Ok
```

You can easily see what happened here: ASC(“g”) takes the character g and returns its ASCII code value, which is then printed. As was the case with the CHR\$ function, ASC can’t stand all by itself: It has to be used with the PRINT command or assigned to a variable.

One surprising and interesting feature of the ASC function is that its argument—the stuff inside the parentheses after ASC—can be more than just one character, as the following example illustrates:

```
10 PRINT ASC("gamophobia")
RUN
103
Ok
```

So although the argument of ASC is a whole word (“gamophobia” means fear of marriage), it returns the ASCII code value of just the first character and ignores all the rest.

ASCII Character Graphics

ASCII code values from 176 to 223 define a variety of special characters useful for many graphics applications. Figure 4 shows a list of these characters.

There are basically two types of characters in this list. The first includes the box-shaped characters or “fillers” of various intensities. These can be used to construct any kind of solid rectangular shape. The second type includes line segments (single and double), corners (single and double), and a variety of line segment intersections. These can be used to construct horizontal and vertical lines (single and double) and a large variety of boxes and combinations of boxes (single and double sides).

We’ll show you examples that illustrate how to draw a variety of simple boxes that can be used around a title or as bars for a bar graph.

The ASCII character of value 219 is a solid box that fills one

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whole character space. Let's use it to construct a solid box that is ten columns high by three rows wide. We'll do it one step at a time.

First, we need to assemble the character boxes into a line. To do this, we need to use the `PRINT CHR$(219)` command many times in different locations. One way to do this is to use the `FOR-NEXT` loop:

```
30 FOR COL = 1 TO 10
40   PRINT CHR$(219)
50 NEXT
60 END
RUN
Ok
```

This is familiar territory. To give our box some height, we can use another (nested) `FOR-NEXT` loop to draw this line at adjacent row positions. Next, we'll use the `LOCATE` command to put our character exactly where we want it. While this is not the only way to accomplish our task, it has the virtue of clarity and ease of use. Modifying the previous program results in the following:

```
10 CLS
20 FOR ROW = 3 TO 6
30   FOR COL = 5 TO 15
40     LOCATE ROW, COL
50     PRINT CHR$(219)
60   NEXT COL
70 NEXT ROW
80 END
```

When run, this program clears the screen and makes a box like this:



Ok

The counter limits of the two loops determine the position and the dimension of the box. So, if we wanted to be able to draw a box of any size anywhere on the screen, we could use variables for the counter limits and let the user assign values to them by means of `INPUT` statements. Let's try it:

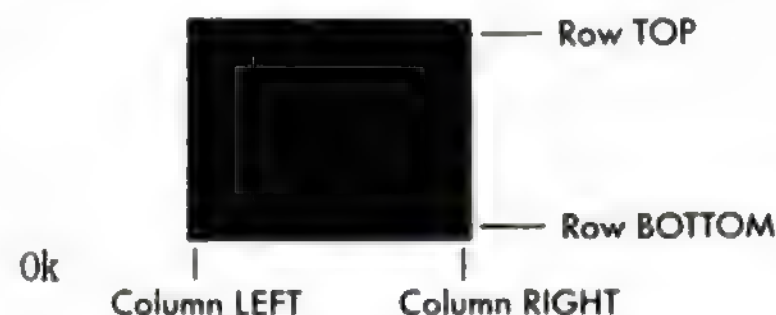
```
100 INPUT "enter row of upper left corner"; TOP
110 INPUT "enter column of upper left corner"; LEFT
120 INPUT "enter width of box"; WIDTZ
130 INPUT "enter height of box"; HEIGHT
```

```
140 CLS
150 BOTTOM = TOP + HEIGHT - 1
160 RIGHT = LEFT + WIDTZ - 1
170 FOR ROW = TOP TO BOTTOM
180   FOR COL = LEFT TO RIGHT
190     LOCATE ROW, COL
200     PRINT CHR$(219)
210   NEXT COL
220 NEXT ROW
230 END
```

If you run this program with the following responses,

```
RUN
enter row of upper left corner . . . . . 4
enter column of upper left corner . . . . . 12
enter width of box . . . . . 15
enter height of box . . . . . 5
```

you get a solid box that looks like this:



We can make any size of box and put it anywhere we want to. Since we used variable names that really reflect the meaning of the variables, the program isn't hard to follow. Note the `= 1` in line 150: it needs to be there if you interpret a height equal to 5 to mean five columns high; if you leave out the `= 1`, you'll get one too many rows. The same is true for the definition of `RIGHT` in line 160. Incidentally, our spelling of `WIDTZ` is not a typo—the word *width*, correctly spelled, is one of those infamous reserved words!

Boxes like this have many uses in producing interesting

218	—	191	201	=	187
┌		┐	┐		┐
		179			186
└	—	┘	┘	=	┘
192	196	217	200	205	188
Single wall			Double wall		

Figure 5: ASCII characters needed to make a box.

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screen displays, backgrounds for titles written in reverse (we'll show you how to do this later), and bar graphs.

Making an Empty Box

Another very useful type of box that the PC can easily draw is an unfilled or empty box. The graphics characters needed are the corners and horizontal and vertical line segments shown in Figure 5. The numbers associated with each graphics character are the ASCII codes for that character.

Let's draw a double-walled box. We'll define its location and dimensions in the same way as in a previous filled-box program: the row and column number of its upper left corner as well as its width and height are to be determined by user input. We'll also use the same variable names: WIDTZ, HEIGHT, TOP, BOTTOM, LEFT, and RIGHT to define the dimensions of the box and the row and column positions of its sides. One way to write such a box program is shown in Figure 6.

When this program is run with the following input,

```
RUN
enter row of upper-left corner . . . . . 4
enter column of upper-left corner . . . . . 8
enter width of box . . . . . 20
enter height of box . . . . . 5
```

we get the following output on the screen:



A great box! The program is fairly long, but not, we hope, too difficult to understand. The first part of the program up to line 170 initializes all the required variables (TOP, BOTTOM, LEFT, RIGHT); the second part, from lines 190 to 280, prints the corners of the box; and the last part, from line 300 to the end, draws the sides of the box using the horizontal and vertical line segments defined by ASCII characters 205 and 186.

At this point you may well ask yourself, "Do I have to go through all this every time I want to draw a box?" The answer has two parts. First, if you need to draw more than one box in a program (for several titles, or for a bar graph) all you have to do is to write the program lines for the box once (these lines will be what is called a subroutine) and reuse that part of the program as many times as you need.

Secondly, there are easier ways to draw a box. By far the

```
80 '---NAME. "DBL-BOX. B10"-----
90 '
100 '---DOUBLE-WALLED BOX PROGRAM-----
102 '
104 CLS
110 INPUT "enter row of upper-left corner-----", TOP
120 INPUT "enter column of upper-left corner--", LEFT
130 INPUT "enter width of box-----", WIDTZ
140 INPUT "enter height of box-----", HEIGHT
150 CLS
160 BOTTOM = TOP + HEIGHT
170 RIGHT = LEFT + WIDTZ
180 '
190 '---LOCATE and PRINT the corners of the box-----
200 '
210 LOCATE TOP, LEFT
220 PRINT CHR$(201); 'PRINTs upper left corner
230 LOCATE TOP, RIGHT
240 PRINT CHR$(187); 'PRINTs upper right corner
250 LOCATE BOTTOM, LEFT
260 PRINT CHR$(200); 'PRINTs lower left corner
270 LOCATE BOTTOM, RIGHT
280 PRINT CHR$(188); 'PRINTs lower right corner
290 '
300 '---draw top, bottom and sides of the box using FOR NEXT-----
310 '
320 FOR COL = (LEFT + 1) TO (RIGHT - 1) 'top and bottom
330 LOCATE TOP, COL
340 PRINT CHR$(205);
350 LOCATE BOTTOM, COL
360 PRINT CHR$(205);
370 NEXT COL
380 FOR ROW = (TOP + 1) TO (BOTTOM - 1) 'left and right sides
390 LOCATE ROW, LEFT
400 PRINT CHR$(186);
410 LOCATE ROW, RIGHT
420 PRINT CHR$(186);
430 NEXT ROW
440 END
```

Figure 6: An example of a box-drawing program.

easiest way is by means of the single BASIC statement called **LINE**—a very powerful tool. The use of this statement is limited, however, to the all-points-addressable graphics mode we discussed earlier—and for that you need the Color/Graphics Monitor Adapter. The box program we just presented, on the other hand, is not limited to any particular IBM PC configuration.

There is, however, something we can do to simplify our previous box program. BASIC provides us with another function, called **STRING\$**, that is specifically designed to draw horizontal repetitions of an ASCII character. In our box program the **STRING\$** function enables us to draw the horizontal sides of the box with two statements in place of the six statements needed for the **FOR-NEXT** loop.

The following example illustrates how the **STRING\$** function works:

```
10 PRINT STRING$(10, CHR$(205))
RUN
Ok
```


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As you can see, the ASCII character number 205 (a double horizontal line segment [=]) is printed 10 times. By changing the number 10 inside the parentheses following STRING\$, we can change the number of times CHR\$(205) is printed. We could have produced the same output using 10 cycles of a FOR-NEXT loop, but using the STRING\$ function is clearly the more concise way of producing the same result. Also, your IBM PC executes the STRING\$ command faster than it would execute the corresponding FOR-NEXT loops.

As is the case with the other functions we've discussed, **STRING\$** cannot stand by itself in a BASIC statement. **STRING\$** defines a string constant and so must be either used with **PRINT** (or with a **PRINT**-related statement) or assigned to a string variable.

An example that really shows off the power of `STRING$` is drawing a box that frames a title. As demonstrated in our previous example, we can use `STRING$` to draw the horizontal sides of our box. However, we can also “add” (concatenate) the corners of the box to `STRING$` to define a new string that draws both a horizontal side as well as two of the corners. For example, the program

```
10 TOPSID$ = CHR$(201) + STRING$(30, CHR$(205)) + CHR$(187)
20 PRINT TOPSID$
30 END
```

produces the output



which is the TOPSIDE\$ of a box (the interior width equals 30 columns) including the corners. This technique really cuts down on the number of program lines we need to write in order to make this part of the box (it also saves time—ours and the computer's).

Let's put all the pieces together in a program that prints out a title with a box around it. The following program puts a double-walled box around the title "THE SECRET LIFE OF THE HUMUHUMUNUKUNUKUAPUAA". The text is centered with respect to a 65 column wide display.

```

100 '-----NAME. "BOX.B10"-----
105 '
110 '-----*****
120 '----* WRITES TITLE WITH OPEN BOX *-----
130 '----*****
140 '
145 CLS
150 TITLES = "THE SECRET LIFE OF HUMUHUMUNUKUNUKUAPUAA"
160 LENGTH = 40
170 LEFT = 12

```

```

180 '
190 '----defines string which draws topside and bottom of box-----
200 '
210 TOPSID$ = CHR$(201) + STRING$(LENGTH, CHR$(205)) + CHR$(187)
220 BOTTOM$ = CHR$(200) + STRING$(LENGTH, CHR$(205)) + CHR$(188)
230 '
240 '----draws TITLE with box around it-----
250 '
260 PRINT
270 PRINT TAB(LEFT) TOPSID$
280 PRINT TAB(LEFT) CHR$(186) TITLES CHR$(186)
290 PRINT TAB(LEFT) BOTTOM$
300 END

```

The output looks like this:

THE SECRET LIFE OF HUMUHUMUNUKUNUKUAPUAA

As you can see, we didn't use any FOR-NEXT loops this time. Instead, we printed the variables TOPSIDE\$ and BOTTOM\$, which we obtained by concatenating STRING\$ and the string values for the corners of the box. The vertical line segments were printed individually with the PRINT command. You might find this program or your own modification of it handy in producing the titles for your own programs. Incidentally, that word that's too long for us to repeat once again is the name of a Hawaiian fish!

Character Attributes

Your keyboard and the other "hidden" characters we've been discussing provide us with a large selection of characters. IBM PC BASIC also provides us with a way of changing how these characters are displayed: we can underline them, make them blink, emphasize them by increasing the intensity or brightness, print them black on white instead of the normal white (really green on the IBM Monochrome Display) on black, or combine all of these features, which are called *attributes*.

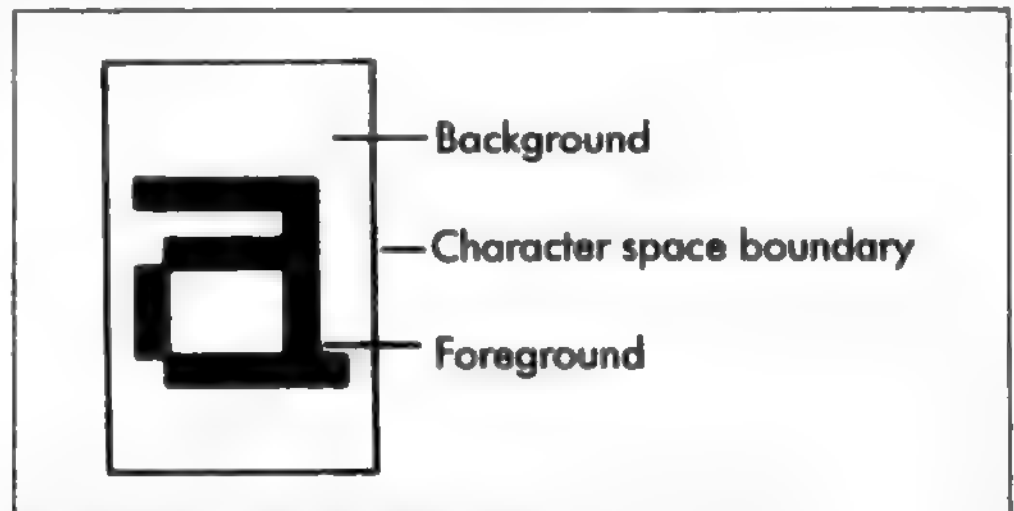


Figure 7: Foreground and background of a character.

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COLOR is the BASIC instruction that controls these character attributes. The instruction COLOR does not imply that you need a color monitor to make use of it! COLOR is a very versatile statement: it does, in fact, control the color on a color monitor, but it also controls character attributes on monochrome monitors. In this chapter we'll deal only with the aspects of the COLOR statement relevant to the IBM Monochrome Display. The COLOR statement controls what is called the foreground and the background of a character, as defined in Figure 7. To use COLOR, you must assign numbers to the

background and foreground in the following way:

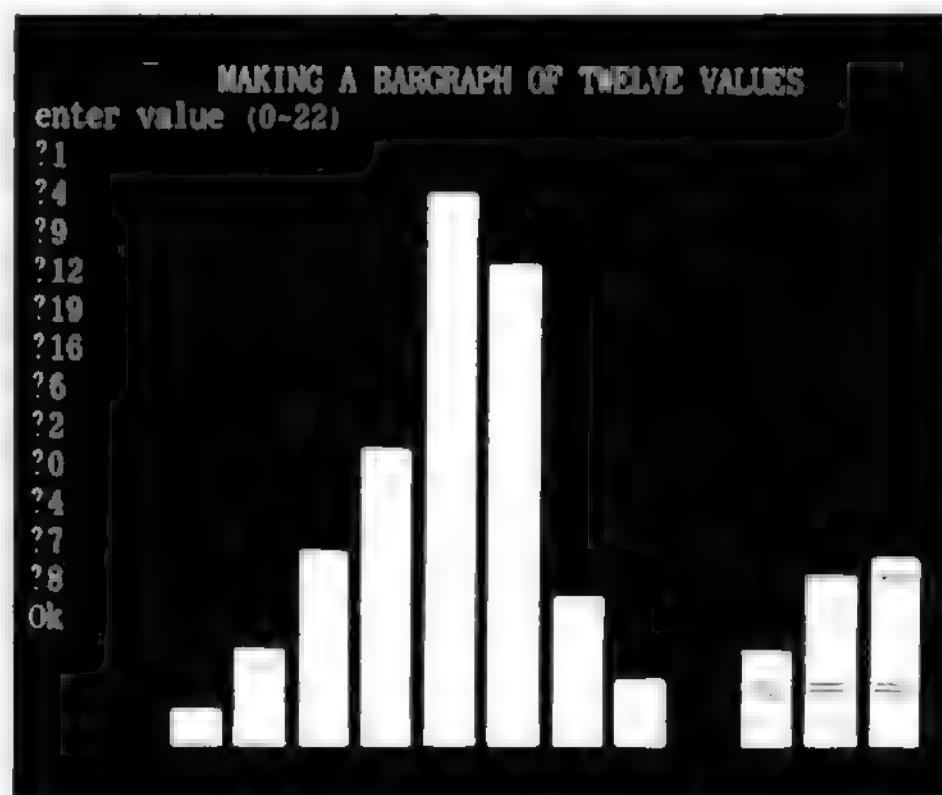
```
10 COLOR 7, 0
```

|
| This number determines the background attribute
| This number determines the foreground attribute.

The number 7 always means "white" (or green) and 0 always means "black" (the way your screen looks when everything is turned off). This particular COLOR statement causes every-

A Graphics Exercise

Write a simple program that draws bars for a bar graph as each value is entered. Include a centered title using the COLOR statement.



Here is our solution:

```
100 '---NAME, "BAR-GRPH.B10"-----
105 '
110 '-----
120 '---* MAKING A BAR GRAPH *-----BY B E-----
130 '-----
140 '
150 '---PRINTs the title-----
160 '
165 CLS
170 LOCATE 1, 22
180 COLOR 1,0 'causes underlining
190 PRINT "MAKING A "
200 COLOR 9,0 'causes underlining, high int
```

```
210 PRINT "BARGRAPH":
220 COLOR 1,0 'back to just underlining
230 PRINT " OF 12 VALUES"
240 COLOR 7,0 'back to normal
250 '
260 '-----initializes variables-----
270 '
280 WIDTH = 4 'defines width of bar
290 BARNUMBER = 12 'defines number of bars
300 LOCATE 3,1
310 PRINT "enter value (0-22):"
320 '
330 '-----draws BARNUMBER of bars-----
340 '
350 FOR I = 1 TO BARNUMBER
360 LOCATE (I + 3), 1 'LOCATES posit. of INPUT of VALUE
370 INPUT VALUE 'INPUT's VALUE to be graphed
380 IF VALUE = 99 THEN END 'means for prgm termination
390 LEFT = 8 + (WIDTH + 1)*I 'defines LEFT side of bar
400 TOP = 23 - VALUE 'defines row equal to TOP of bar
410 REM
420 REM---draws one bar-----
430 REM
440 FOR ROW = TOP TO 22 'controls height of bar
450 LOCATE ROW, LEFT
460 PRINT STRING$(4, CHR$(177)), 'PRINTs row of ASCII char. 177
```

The output graph above is fairly self-explanatory. The bars are assembled out of the solid-block ASCII character 177 (it totally fills a character space at medium intensity). The PRINT STRING\$ statement in line 460 prints a single row of the bar, and the FOR-NEXT loop defined by lines 440 and 470 stacks these rows on top of each other to draw the whole bar. The FOR-NEXT loop defined by lines 350 and 510 is responsible for drawing a bar each time a new value is entered in response to the INPUT command.

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thing following it to be printed as white on black, which, of course, is nothing new. When you turn on your computer, it selects this particular COLOR mode automatically because it thinks that that's what most people want most of the time. COLOR 7,0 is the default COLOR setting.

Other numbers have different meanings. Try the following example:

```
10 COLOR 1, 0
20 PRINT "what attribute is this?"
30 COLOR 7, 0
40 END
RUN
what attribute is this? ← Note the underline
Ok
```

So the number 1 assigned to the foreground of the COLOR statement in line 10 causes whatever is printed to be underlined. COLOR 7,0 in line 30 returns the computer to printing things without underlining. If you leave it out, everything from then on will be underlined, including the "Ok" prompt and whatever you write onto the screen after the program is finished. Your computer will remain in the last COLOR mode set until it encounters a new COLOR statement (or a direct mode command), even though the program that set the COLOR mode may have finished running a long time ago.

Now change line 10 in the previous program to read COLOR 0,7. The foreground should now be black (0), while the background should turn white (7): that is, we should get black letters printed on a white (green) background. Sure enough, when you run this program, you'll get:

```
RUN
what attribute is this? ← Inverse black on white background
Ok
```

Ok, you get the idea: the COLOR statement requires you to translate an effect you want to create into numbers. These numbers don't have any intrinsic meaning to us, so this kind of statement is a bit harder for us to use than the more "user-friendly" statements we've encountered before. However, the COLOR statement has the advantage of being very concise and easy to interpret for your computer.

There are many different combinations of COLOR attributes possible. The rules for finding the foreground and background numeric values that will give you specific effects are summarized in Figure 8. For example, if we wanted to cause printing with white on black, underlined at high intensity and

Foreground number	Effect (attribute)
0	black
7	white
1	causes underlining
add 8	causes high intensity
add 16	causes blinking
Background number	Effect (attribute)
0	black
7	white

Figure 8: Monochrome color attributes.

```
100 CLS
110 PRINT "enter your ".
120 COLOR 9,0 'high intensity blinking
130 PRINT "PASSWORD".
140 COLOR 0,0 'black on black, i.e. invisible
150 INPUT PASSWORD$
160 COLOR 7,0 'back to white on black
170 PRINT "aha! so your secret PASSWORD is ".
180 COLOR 16,7 'white on black, blinking
190 PRINT PASSWORD$
200 COLOR 7,0 'back to "normal"
210 END
Ok
```

Figure 9: The COLOR statement can be used to input a secret password.

blinking, all at the same time, we'd use COLOR 25,0 since 1 (for underlining)+8 (for high intensity)+16 (for blinking)=25.

COLOR is a very useful statement whenever you need any special effects on your screen. The example in Figure 9 shows how it can be used to input a secret password.

When the Figure 9 program is run, it produces the following output:

```
RUN
enter your PASSWORD?
aha! so your secret PASSWORD is dinkelspiel
The PASSWORD we entered
```

Here you see some of the neat special effects that COLOR can control, including making text invisible! COLOR 0,0 in line 140 says "from now on, make both the foreground and the background black." That way the password that you subsequently entered is invisible to snoopers onlookers! ■

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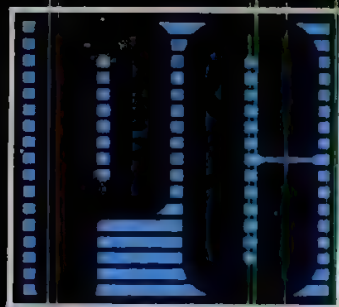
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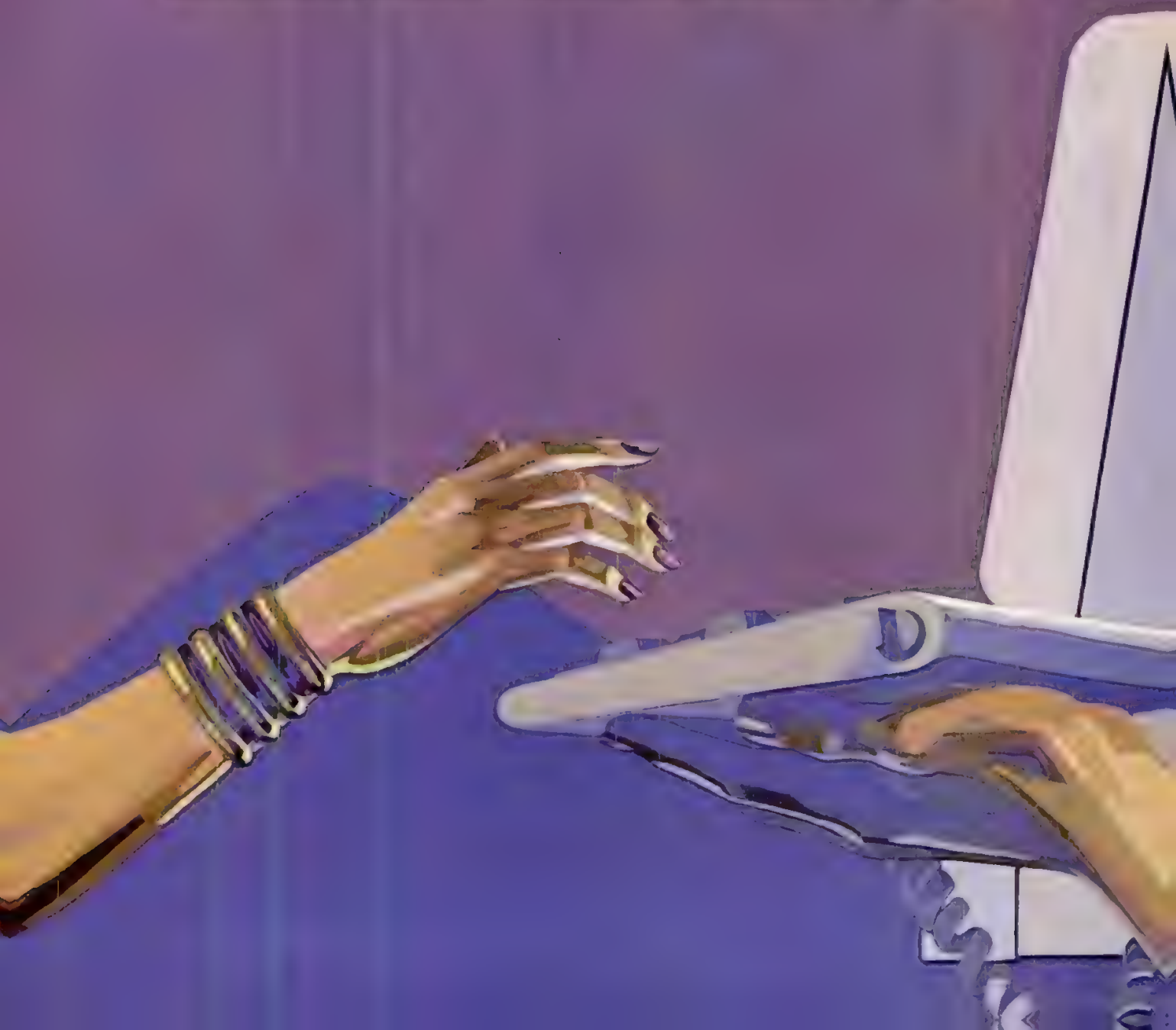
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TRAINING/HEIDI WALDROP

LEARNING THE PC WITH LOVED ONES

Computer-wise and not-so-computer-wise family members discover the joys and frustrations of learning and living with the PC in the home.





When a PC arrives in the home, spontaneous tutorials take place as family members offer to teach one another how to get the most out of the new machine.

When a PC finds a household niche, perhaps dethroning the TV set as a major source of entertainment, some familiar conflicts are bound to arise. Instead of brothers and sisters arguing over which television program to watch, they will be arguing over which software program to boot up. Parents may find themselves telling the little ones, "No, you can't play *Space Invaders*. It's time for bed."

But before everyone in a PC household can jump into the fray, there's usually some teaching and learning to be done. I set out to explore the dynamics of these "human tutorials," expecting to find the computer-wise family member confidently showing the not-so-computer-wise one the ropes. I soon discovered, however, that in families where the PC is a new arrival, parents and children teach one another. Here's a look at five homes where a micro has come, stayed, and conquered.

The Kellys

On a typical day at the Kelly's in Salt Lake City the PC is in almost constant use. Petrea, who is a mother of ten children, may spend several hours with the word processor, writing an article for her husband's magazine, *The New Era*. Then, while her 9-month-old daughter Elizabeth takes a nap, Petrea sits at the computer with 2-year-old Bryan Joseph on her lap, and they match letters in the *Early Games for Beginners* program. Four-year-old Rebecca skips in and joins the game. A few minutes later the door slams, signaling the arrival of the older kids. Megan, 16, and Heather, 13, come bounding up the stairs and through the door.

After Petrea has mediated the discussion over who gets first crack at doing homework on the machine, things quiet down for an hour or so. Then it's 15-year-old Sean's turn; he pulls the stereo up close to the PC. Plopping down in the chair, he puts on Billy Joel's album, *The Entertainer*, and continues his efforts to program the computer to play the song. Over the next couple of hours Bronson, 11, comes in to finish printing out his his-

tory paper and Dillan, 9, Erin, 8, and Brigham, 6, crowd around the computer to play *Snipes*. With ten kids in this household, a heavy workout like this one is not unusual for the PC.

Even though the Kellys have had the PC for only a year, it has clearly become part of the family. Megan insists she can't go away to college because she won't be able to write her papers without a PC for word processing.

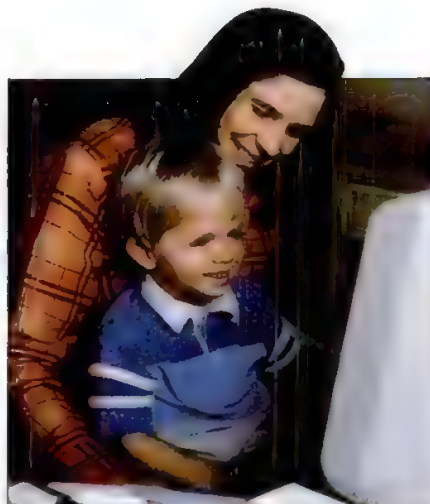
For a few weeks after the PC arrived in the Kelly household, Bryan senior wondered if he'd ever get to use it for word processing—that was, after all, the reason he bought it. Instead, he says, "I'd come home every day and the kids would be gathered around the PC with their friends. I'd cringe as I saw grubby little fingers hitting the same keys over and over again on my \$5,000 machine." With time the newness has worn off, rules have been set up, and the PC fits right in.

From the beginning, Sean emerged as the expert. "He wasn't afraid of the computer, and he knew some computer terms that were completely foreign to us," says Petrea. Her major frustration was making

sense out of the printer's elusive *modus operandi*. She learned how to deal with it by taking a deep breath and then another look. "Sometimes the printer does crazy things—it is so *unreasonable*," she says. "I'd sit back and think, 'This is a logical piece of machinery. There's got to be a reason for this.' Then I'd work backwards to figure out what went wrong. I get a great feeling of satisfaction when I work out a problem like that."

Over the last year family members have developed specialties and passed on their knowledge to the others. Sean knows the most about programming; he showed Bronson how it's done. Petrea taught Sean how to use the word processor, and Sean and Bronson are the game whizzes.

The teenagers sometimes get frustrated as they watch their parents struggle with a program. "Mom and Dad approach programs differently than we kids do," says Sean. "They read the entire manual before they even load the program. Me and my friends put the disk right in and play around until we figure it out. Then if we



Petrea and Bryan Kelly

have a question we go to the manual. It seems easier that way."

No matter how the various members of the Kelly family have learned to work the PC, one thing is certain: It's become invaluable to everyone from Dad down to 2-year-old Bryan Joseph. What about the only other member of the family, 9-month-old Elizabeth? The Kellys plan to start her on the easy games as soon as she can sit up at the computer.

With ten children in the Kelly family, the PC gets a tough workout every day. Parents and children use the machine for everything from composing music to playing games, and 15-year-old Sean has emerged as the expert.



Brigham, Heather, Megan, Sean, Dylan, Bronson, and Erin Kelly



Miranda and Lindsay Van Gelder

Lindsay, Miranda, and Sadie Van Gelder access databases, learn word processing, play games, and program on their 2-year-old PC. And they share the occasional frustration the PC causes.

The Van Gelders

In the Van Gelder household of Lindsay and her daughters Sadie and Miranda, it's clear that the computer has priority. The PC has a privileged nook in the Van Gelder's New York City apartment, beneath Lindsay's loft bed. Inside the cavelike corner there's plenty of room for this household of computer lovers to gather around and watch the newest feat one of the three has discovered. (The Van Gelders aren't strangers to PC. In an upcoming issue, Lindsay, a contributing editor to PC, and her daughter Sadie will review *Bank Street Writer*.)

It could be setting 13-year-old Sadie up with middle-aged beaus on the Dial Your Match bulletin board, or running through the detective program 11-year-old Miranda wrote for her mother's birthday. "We spend a lot of time on CompuServe," says Lindsay. "We'll explore different aspects of it and say, 'Hey, you've really got to go try this out or check out that database.' It might be different in other families, but we learn from one another," says Lindsay.

Things didn't always run so smoothly for this computer family. Although they had all been exposed to a dedicated word processor through Lindsay's former job as a writer at the *New York Daily News*, the micro was a different beast altogether. "When the computer arrived there was still an incredible amount of information that I didn't know. I'd been reading about it for months, but there wasn't that much literature out there when we got our PC 2 years ago."

Sadie admits that those first few weeks were a nightmare, especially for her mother. "Mom was getting hysterical because she thought the machine was supposed to click when you put the disk in. There

wasn't a real loud click so she thought it was broken," she says.

Hooking up the PC was one of the first major hurdles for the family. Lindsay began to believe that the instruction manuals were written by people who couldn't count. "There was this gizmo you hook up the monochrome monitor and the parallel printer cable to," she explains. "And there's something called a standard nine pin that really has only six pins on it. I kept looking for the other three. There was a lot of screaming at first."

Once the PC was firmly in place and working, the fun and challenge of computing in a family setting began. Sadie took on the challenge of programming and taught her mom bits of BASIC; Lindsay taught her daughters such essentials as how to initialize a disk. The machine serves as a word processor for Lindsay and her daughters; its games provide entertainment. "I keep hearing about parents who don't want to buy their kids computers because they think all the kids will do is play *Pac-Man*," says Lindsay. "Although they play games, it is programming that provides endless fascination."



Sadie Van Gelder

The Barkers

When the IBM PC came into the Barker home in Monterey, California last fall, it wasn't the only computer in the house. Each member of the family had already been initiated into the micro universe. Ed does scientific programming on a mainframe computer for the Navy, Karen uses micros to teach life science and math at Monterey High School, Randy, 11, attends a special math/science school where he works on computers daily. Even Amy Jo, 5, had played around with the Kaypro the family bought last spring.

Although this family had a certain amount of computer savvy, there were still some surprising things to be learned when Karen brought home the PC from school on loan. "The high school installed PCs for teachers to use, and we were allowed to take one home for a few months so we could get used to them," says Karen. This was an opportunity the Barkers couldn't pass up. Ed was anxious to see what the PC could do, and the kids couldn't wait to try out the graphics.

"When Mom brought it home we all headed straight for it," remembers Randy. "It has great color, sound, and graphics—things that Kaypro doesn't have." Ed adds that the IBM was easier to program than the Kaypro because it has a full screen editor. The BASIC primer turned out to be a big help for him. Ed had worked on massive mainframes using technical languages, but BASIC was new to him. In fact, Randy taught his dad the BASIC he had learned in school. "Teaching Dad BASIC was mostly going through the primer together and trying the examples," says Randy.

The instructor disk that came with the

PC was also a great help to the Barkers. "It explains how the PC works step by step," says Karen. "I had gone through it at the workshop, but when I brought it home Randy just took off and learned it by himself."

Amy Jo's favorite occupation is typing words from a book onto the screen; Randy stays close by to help when she can't find the right letter. "That's a big deal for her," says Ed. "She doesn't know words yet, but she matched the letters to the keys when she copied them." She also used a sketch program that her father created so she could pick the colors and symbols she wanted to put on the screen. Ed put the program together from other programs he'd seen. "Our approach was to find books of programs for the PC, type them into the computer, and modify them slowly to tailor them to what we wanted."

All four members of the Barker family were computer veterans when they got their PC, but they quickly found new ways to use it, ranging from learning BASIC to identifying letters on the keyboard.



Randall, Karen, Amy and Edward Barker

Evelyn and Bud Johnson first bought their PC for word processing and to help handle their artists' representative firm. Now, Deborah, their 5-year-old granddaughter is in on the action, too.

The Johnsons

Five-year-old Deborah Johnson sits cross-legged in her grandfather's smooth wooden antique chair, her head cocked in concentration as she stares at the IBM PC monitor. Her nose is at keyboard level, but she can still reach far enough to punch the commands for her favorite program, *Facemaker*. "I like it because I don't need any help to do it," she says. Beyond the monitor, New York City skyline can be seen through the window. There's no distracting Deborah, though—she has to decide which nose to add to the face she is making.

Evelyn Johnson, co-owner with her husband Bud of an artists' representative firm, has just finished loading the program and watches proudly as her granddaughter executes the commands. After rolling Deborah's chair into place against the desk and putting the intercom phone next to the PC, she goes into her office to finish the day's business. "I set Deborah up with the

phone next to her, because her feet don't reach the floor and she has trouble getting out of the chair," says Evelyn. "If she needs help, she can call on the intercom."

Deborah's tiny fingers may peck the keyboard silently, but for her grandparents the PC is an invaluable business tool. The Johnsons bought the PC about a year ago for use as a word processor to write and edit the books each is working on and to keep accounts on the artists they represent internationally. Evelyn has also published several cookbooks and currently has five stored on disk.

One of those cookbooks led to Evelyn's first experience with *WordStar*. "I had a deadline for a particularly difficult book. So as soon as Bud put the PC together I started teaching myself *WordStar*." She learned it within 36 hours and is still convinced that it's the best word processing program around. "People say *WordStar* is tough, but I like it. It doesn't bother me to have all the formatting symbols on the screen," says Evelyn.

After her crash course, it was Bud's turn to learn *WordStar*. He used his vocal cords a lot during the first few days. "What I'm best at, when I sit down at a computer, is hollering for help. I'm great at that. Then Evelyn rushes in and tells me how to fix it," Bud says.

Bud has found *PC File* to be his favorite program and continues to stick with it even though the couple has the wonders of *dBASE II*, Lotus' *1-2-3* and *VisiCalc* at their disposal. "I believe in doing things the simple way," says Bud. "If a program meets your requirements, there's no sense in getting a more complicated one simply for the sake of it. At a certain point it becomes overkill."



Evelyn and Bud Johnson

The Daytons

Talk of IBM was common in the Dayton household; the announcement that a PC would be coming home in December 1982 barely caused a ripple. But after the machine settled in and its applications were discovered, the ripple turned into a tidal wave.

Bob Dayton has worked with computers for 30 years (including 13 years with IBM) and is now a computer consultant to corporations planning to integrate computers into the work place. "I've been around computers all my life," says middle son Mike, 28. "They never really turned me on; I used to feel overwhelmed when we went down and looked at the big machines at Dad's office. So when Dad got the PC I expected that it would be difficult to learn."

Mike never cared much for mechanical things. He'd seen his dad get excited about some new computer twist, but it wasn't until he learned about micros and realized how easy they are to use that he became interested in the PC. "What really turned Mike on was when I showed him how to access a computer bulletin board," says Bob. "When I showed him how and he did it by himself, he thought he'd mastered the world!" Mike remembers when they finally got through to a bulletin board in Connecticut and copied a program they were both curious about. "It was called 'Food Processor.' We chose it because we had no idea what it could be. It turned out to be the word *food* going back and forth across the screen, faster and faster until it looked like it was being sliced or grated or something."

At times it was tough for Bob, who'd taught plenty of people about computers in business, to teach his own son. "Much

more emotion comes into play," says Bob. "Most people are impatient—they want to become experts right away, before learning how the keyboard works or the command structure. They're not interested in that first necessary 10-minute lecture. When someone in the family gets frustrated about learning the basics, it becomes more emotional."

As Mike and his mother, Barbara, learn more about the PC, Bob learns about the strengths and weaknesses of software he may use in his business. "I've done too much switching back and forth between programs to properly evaluate them myself. My opinion is tainted by the last bad program I saw," says Bob. He may have his wife and son go through a tutorial or parts of a program to see if they're user-friendly. "If Mike and Barbara have too much trouble with it, I won't recommend it to a client, since it would probably cause trouble for people in an office, too." ■

Mike Dayton, 28, never cared much for computers, even though his father Bob had worked with them for 30 years. But when dad brought home a PC, Mike showed more than a casual interest. Now father and son compute together.



Bob and Mike Dayton

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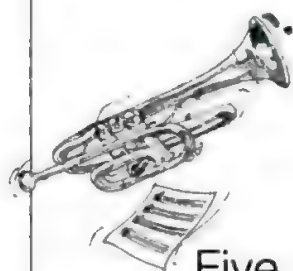
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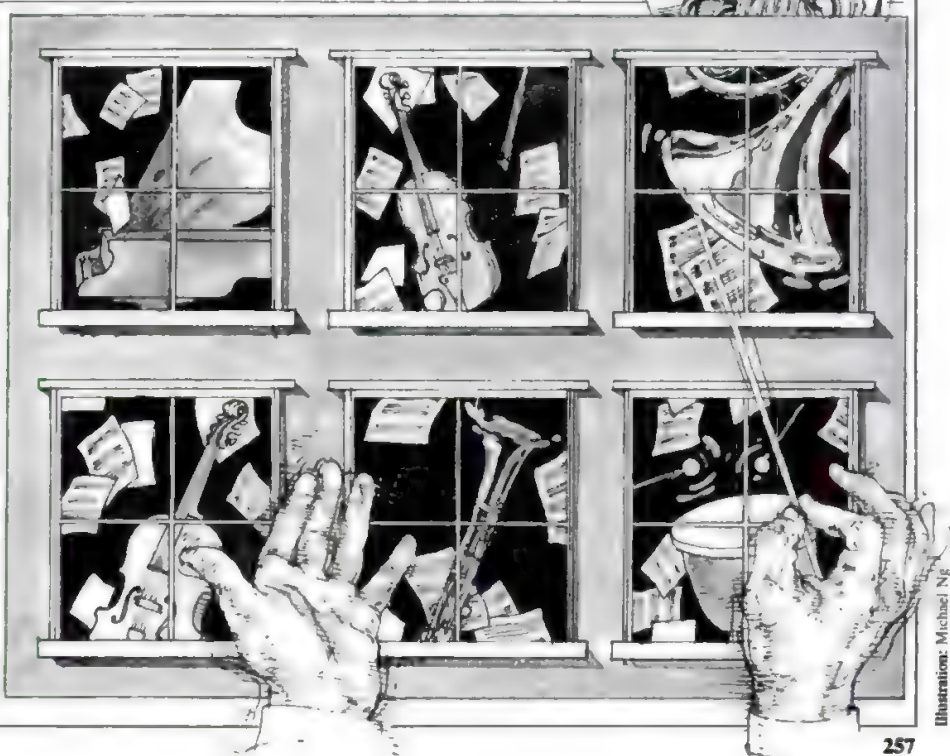
Lotus Orchestrates a Symphony



Five applications—word processing, communications, database management, spreadsheet, and graphics—make music together in Lotus' follow-up to 1-2-3.

If you use 1-2-3, you might like 1-2-3-4-5 even better. Industry insiders have long been aware of Lotus Development Corporation's intention to add word processing and telecommunications to the database, spreadsheet, and graphics of 1-2-3. Lotus has fulfilled its promise, but rather than rework 1-2-3, the company orchestrated a completely new program, *Symphony*.

Symphony is not merely an enhancement to 1-2-3—its capabilities exceed 1-2-3's in some interesting ways. Lotus will sell it as a separate product while continuing to market and support the best-selling 1-2-3. To avoid competing with itself, Lotus plans to market 1-2-3 as an analytical tool and *Symphony* as a productivity tool, gearing the two programs for separate audiences. Present and future 1-2-3 owners will be able to obtain *Symphony* for \$200, the difference between the pro-



grams' list prices (*Symphony* will retail for \$695).

Symphony won't be ready for release for a few months. Meanwhile, here's a sneak peek at the program's capabilities.

One of the biggest surprises *Symphony* has in store is a full-fledged window management system. The most exciting aspect of windows is that they let you display the various functions of an application on the screen simultaneously. By integrating a spreadsheet window with graphics and word processing windows, for instance, you can see changes in the spreadsheet change other windows that are dependent upon it.

Symphony stores information in a common workspace shared by all of its functions. Windows are your means for peering into this common workspace. Each window has its own functional attribute, such as spreadsheet, graph, or document. Two or more windows can be used to view the same data in different ways. For example, a graphics window might contain a bar chart whose underlying data is displayed in a separate spreadsheet window. The spreadsheet and chart share the same data in the workspace but view it in different forms. Alternatively, you could use the windowing feature to view different parts of the workspace within a single function. For example, several word processing windows could show you different pages of a long document.

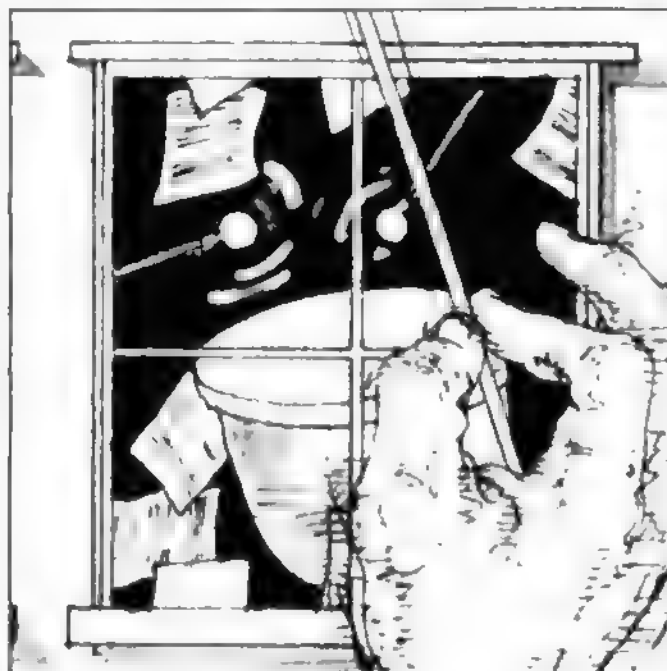
Windows can have different sizes and they can be displayed on the screen either overlapping each other or in a "tiled" arrangement, side by side like floor tiles. The cursor movement keys expand or contract a window to the size you want and a "zoom" key can temporarily magnify a window to fill the entire screen.

Well-Rounded Applications

Windows and integration are great, but for a product like *Symphony* to live up to its promise, the applications it integrates must be full-featured. If *Symphony*'s component applications are as complete as Lotus claims, purchasers won't need to

buy individual word processors, database managers, or communications software. Here's a brief look at each application.

Symphony's word processing program provides all the usual features: left and right justification, automatic word wrap, block functions, search-and replace, bold-



A "zoom" key can temporarily magnify a window to fill the entire screen.

facing and underlining, sub- and superscript, and automatic pagination including headers, footer, page numbers and dates. Like the Wang word processor, *Symphony* uses format lines to control the appearance of text. With multiple format lines you can instruct *Symphony* to indent subsections of text or change the vertical spacing in the middle of a document.

1-2-3's approach to database management viewed the spreadsheet as a database, since both are tables of columns and rows. *Symphony* abandons this notion; its database records are entered and retrieved on electronic forms that you design. Each form corresponds to a record. Forms-oriented database management makes it much easier to output selected contents of the database to preprinted forms such as invoices and purchase orders.

Symphony can store over 8,000 records in a database, subject to memory constraints, and it can sort the records on three

fields (*1-2-3* allowed two). Database querying features include locating, extracting, and deleting records.

Integrating the database with the word processor gives *Symphony* mail-merge capabilities. You can use the word processor to create a form letter and instruct *Symphony* to insert the name and address sections of the letter from a file of customer names and addresses.

Symphony's spreadsheet includes the same features that have made *1-2-3* so popular as a spreadsheet program—but *Symphony*'s spreadsheet is four times larger, with 8,192 rows and 256 columns. *1-2-3*'s spreadsheet is thus a subset of *Symphony*'s; you can convert most *1-2-3* worksheets to *Symphony* directly (except for some *1-2-3* macros). In addition to *1-2-3*'s financial, arithmetic, statistical, and logical functions, *Symphony*'s spreadsheet has some additional features: time function makes it aware of the time of day, the ability to "hide" cells by inhibiting their appearance on the screen, a security feature prevents unauthorized users from accessing a spreadsheet, and text manipulation within spreadsheet formulas.

Eight Chart Flavors

Symphony includes eight types of charts: area (the areas between curves are shaded), shaded and exploded pie (a single piece of the pie can be enlarged), open-high-low-close (used to display stock market prices), line, bar, stacked bar, and x-y. Since charts are linked to the workspace, changes to underlying data automatically affect them, giving *Symphony* "what-if" graphics capability.

While the window management system shares information within the *Symphony* environment, the asynchronous communications package lets you exchange data with the outside world. If you own a modem, you can use the automatic dial-up capability to access remote databases. You can also communicate directly with another *Symphony* user to exchange data files.

Since different applications can require

A Closer Look at Windows

One of the biggest surprises in Symphony is its windowing capability. Here are two examples of the usefulness of that feature.

Symphony's window management system is capable of displaying different aspects of an application simultaneously on the screen. Figure 1 illustrates Symphony's windowing capability as well as its ability to integrate database management and word processing. Here, the user has chosen to overlap three windows as opposed to tiling them side by side. The top window, which holds a record from an insurance broker's database of clients, is the active window. The user is currently in the database environment and may now elect to edit any of the items in the form that was retrieved.

The two windows behind the form contain documents created with a word processor. Both are copies of a form letter the broker is sending to each client. The form letter includes data that pertains to each client, such as the monthly benefit and waiting period. The client's name and address, together with policy data, are database items that have been integrated into the two form letters. Changing an item in the form would affect the document window.

Figure 2 is a quarterly forecasting spreadsheet. The screen contains six windows: three spreadsheet windows, two graphics, and one word processing. The spreadsheet above the graphs controls the sales growth projections. In the example, January sales begin at \$2,500 and grow at a monthly rate of 8 percent. The Q1GRAPH window displays an exploded pie chart with the first quarter revenues broken down by month. The Q2GRAPH window is a bar chart comparing sales, cost of goods sold, and profits for April, May, and June.

(continued)

Figure 1: This sample screen integrates a database and word processing, resulting in mail-merge capabilities.

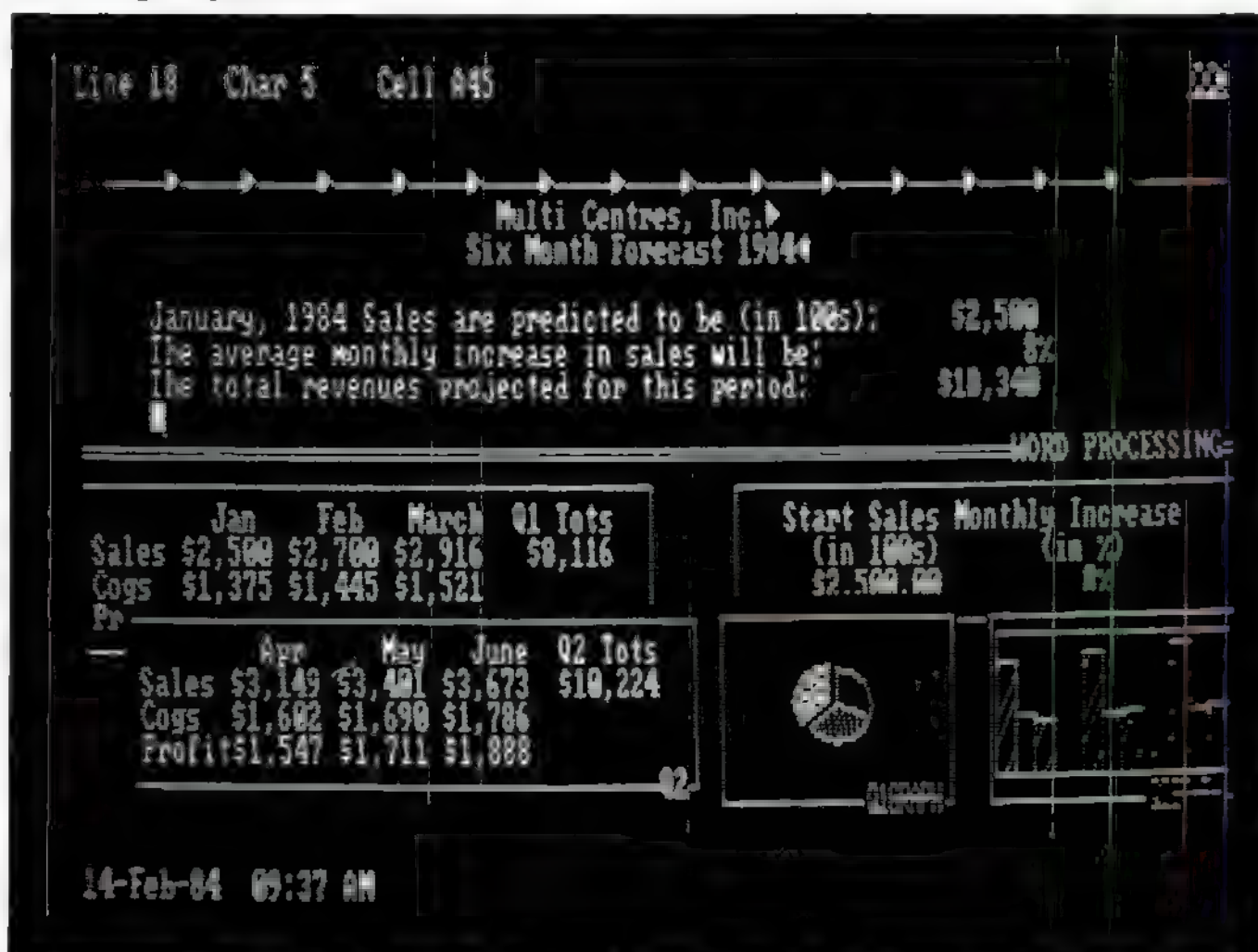


Figure 2: The six windows shown here integrate word processing, graphics, and spreadsheets.

(WINDOWS continued)

The word processing window at the top displays a report that is based on the spreadsheet results. The "DOC" indicator on the top right means that *Symphony* is in the document mode and that the word processing window is the active one. Notice the format line, which forms

All five functions of *Symphony* can be integrated, with or without windows.

the top of the window and sets the tabs and margins. Also note the cursor beneath the last line of the document. The information in the top left of the screen indicates that the cursor is on the eighteenth line of the document, five spaces from the left margin.

Changing an item in the spreadsheet assumption window automatically changes items in the other windows that depend on the assumptions. The quarterly spreads are updated, the graphs are redrawn, and the document reflects the revised results.

All five functions of *Symphony* can be integrated, with or without the use of windows. By developing a macro to automate procedures, you can create customized applications. For example, you could create a macro to dial up a mainframe database service through the communications package. Then you could capture the information in a database and automatically update spreadsheets, graphs, and documents that depend on the captured data. And that's only the beginning! —E.M.B

individual communication parameters, *Symphony* gives you access to various telecommunications settings. In fact, you can store groups of communications settings separately and retrieve the appropriate settings for a specific application. *Symphony* supports the XMODEM protocol for file transmission.

The communications package can interrupt a communications session temporarily to let you examine data you retrieved. You can direct the captured data to a separate window and view the incoming data and the terminal session simultaneously.

Certain applications involve repeating a sequence of commands or entries frequently. For example, say you need to print invoices selected from a receivables database each month. Instead of repeating the command keystrokes each time, you can develop a macro procedure—a batch of *Symphony* keystrokes that you can invoke at any time to execute a task.

To create such a macro, you write down the keystrokes the task requires, translate them into the *Symphony* Command Language (the language used to develop such batched procedures), and store the translated procedure in the workspace.

Symphony also offers a "learn mode" for developing macros. Once you enter the learn mode, *Symphony* automatically records the commands and keystrokes as you enter them in a dry run. This is clearly the simpler approach.

The *Symphony* Command Language does more than allow you to batch keystrokes, however. The language incorporates commands that direct the flow of control within a macro. Programmers will recognize these commands as branching, looping, and testing statements. You can also call a subroutine macro from within another macro and then return control to the calling macro. In a sense, the *Symphony* Command Language is a programming language in its own right. It will allow software developers and advanced users of the program to create highly automated

and customized *Symphony* templates for specific applications.

Symphony's Sociability

Symphony's windows do not work with other vendors' programs—they are internal to *Symphony*. However, *Symphony* will run with Microsoft's *Windows* and Quarterdeck's *Desq*. It can share and exchange information with other programs running concurrently in those environments.

In addition, *Symphony* will support the IBM 3270-PC. Since the 3270 itself has windows that can act as separate and simultaneous terminals to a mainframe computer, *Symphony's* support could be significant for data processing workers who keep one foot firmly anchored in the mainframe world.

A more direct channel for expanding *Symphony* is through add-in products. Lotus plans to enter into strategic agreements with third parties who will produce and support add-ins to enhance *Symphony* or tailor it to specific needs. For example, a software developer might create a more versatile and flexible graphics package to run within *Symphony* and increase the number of charts available.

Add-ins will look as if they are part of the system; you'll attach them to *Symphony* through a command menu. A spelling checker, graphics package, and mainframe database access package are among the add-ins Lotus expects to commission. Lotus itself will be producing add-ins as well, including one that will come with the package: a utility that will permit you to freeze your *Symphony* session, perform DOS functions, and then resume where you left off.

Symphony's hardware requirements are minimal in relation to other integrated software packages. *Symphony* works with one 320K disk drive and a minimum of 320K RAM. The software takes advantage of the maximum expandability of RAM, 640K on the PC. Because *Symphony* does not require a hard disk, it will enjoy a cost advantage over some compet-

itors. Most users will want more than the single disk drive configuration, though and extensive applications will require more than the 320K RAM minimum.

The small size of the program will allow Lotus to manufacture *Symphony* for lap-sized portable computers. The company plans to support the 16-line displays used on some of these portables. If the telecommunications function of *Symphony* supports the transfer of *Symphony* files and programs between a portable and a full-sized PC, this feature could enhance the mobility of integrated applications.

The Ultimate Software?

Will *Symphony* fulfill every software need? Undoubtedly, the program will have limitations even if Lotus delivers all of the announced features. For one thing, *Symphony* is totally memory-based; it does not use the disk to perform operations. Being memory-based makes *Symphony* fast (demonstrations indicated that it executes as quickly as 1-2-3), but it also limits the size of applications. If your application requires 15,000 records or uses 6,000 records of 50 fields each, you will need a different database manager.

Another restriction involves producing a report mixing text and graphics. While you can intermingle text windows with graphics windows on the screen, you cannot print them together. The myriad of functions that *Symphony* promises to perform may overwhelm many people. The greatest challenge Lotus faces is making *Symphony* manageable to the productivity workers that comprise its market. *Symphony* will include over 200 on-line help screens as well as a tutorial on disk to supplement its manuals. Perhaps more than any other software product in microcomputer history, *Symphony* will require superlative documentation and support to deliver its potential power to its users. ■

Edward Baras, the author of *The Osborne/McGraw-Hill Guide to Using Lotus 1-2-3*, is a senior financial analyst at Standard & Poor's Corporation.

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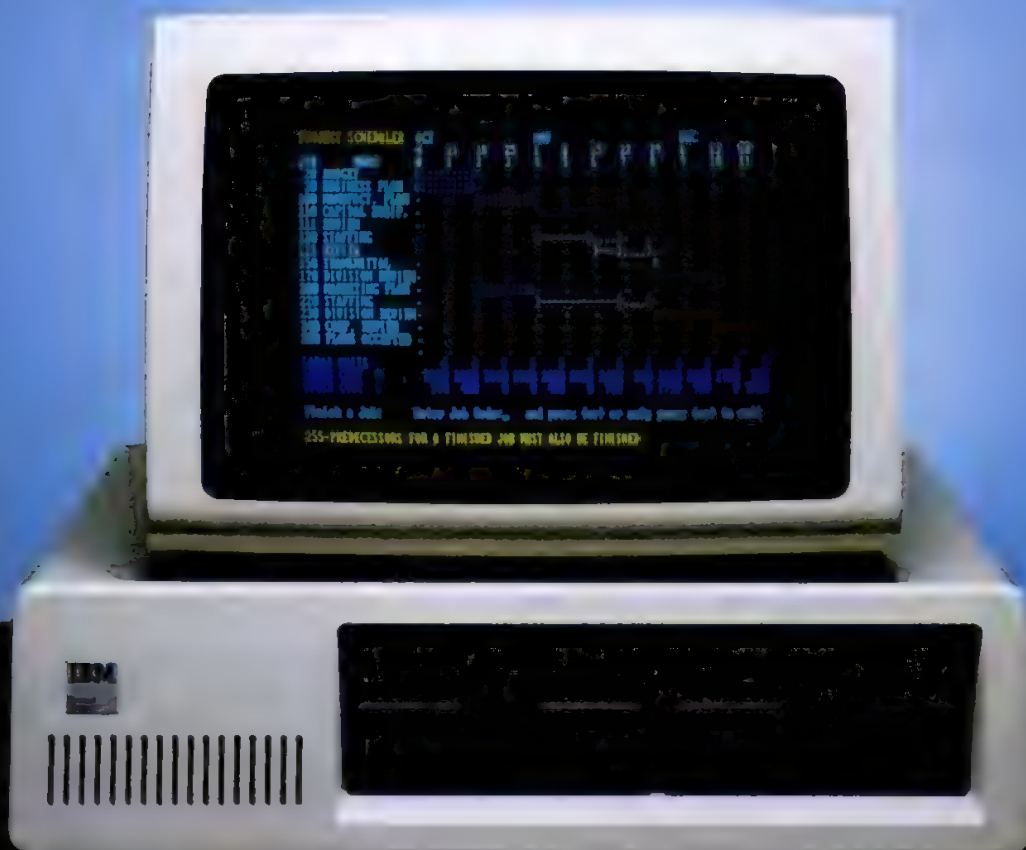
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The Whimsical World of Samna

Samna Word II is a quirky program with a few nifty tricks up its sleeves, but it lacks the power and slickness necessary to survive in the competitive word processing marketplace.

Back in the bad old days, when the only PC word processors we had were rickety versions of *EasyWriter* and *WordStar*, we might have fallen upon a program like *Samna Word II* with shouts of joy and tears of thanksgiving. But 2 years is a long time in the software business. Today, in order to take on the likes of *The Final Word*, *Palantir*, or *WordPerfect*, a new program has got to be slick enough to slide uphill. *Samna Word II* isn't.

Samna Word II, Version 1.0

SAMNA Corp.

2700 N.E. Expressway, #C 1200

Atlanta, GA 30345

(800) 241-2065

List Price: \$450

Requires: 192K RAM with DOS 1.1 or 256K RAM with DOS 2.0, two disk drives.

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While it does many things well enough, it has enough quirks to place it low on my list of favorite word processors.

One thing can be said for *Samna*: It's easy to learn. It has a tutorial disk that's practically moron-proof and onscreen help texts that will steer you out of just about any jam. If you get stuck anyway, there are nice people at the other end of a toll-free number to help you out. But none of this is worth much if the program doesn't do what you need, or if it does it so slowly that you'd rather not wait.

Samna gives you some of the worst news right away. For starters, it takes nearly a minute and a half to load. When you finally get action, you are looking at one of the strangest screens in the business. Your margins are marked out with columns of light. If you'd rather look at a clean screen, you have to set your margins at columns 0 and 80. In some future

release SAMNA Corporation promises to let you turn off this light show, but for now you're stuck with it.

Once your eyes have adjusted to the glare, editing is uncomplicated. The *Samna* keyboard is laid out intelligently, and for those who like that sort of thing, the package comes with little sticky labels you can attach to the function and cursor keys. Cursor control is one of *Samna*'s better features. If you hit the Word, Sentence, Line, Paragraph, Page, or File (document) key, the cursor will move by that amount. To go in reverse, you hold down the Shift key while you move the cursor.

The elegance of this design is marred by the cursor's tendency to stumble over certain characters. For example, it treats a carriage return, tab, or other format character as if it were another word or sentence, and you have to hit the key again to get around it. Cleverer programs get

around these obstacles.

The GOTO key (5 on the number pad) works better. If you hit it and then hit any of the arrow keys, the cursor will go to the right or left end of the line, or to the top or bottom of the screen. The sequence Go To, Page, a numeral, and then Enter will take you to the beginning of the page you specified—a command that's both handy and easy to remember.

A la Mode

The deletion and insertion functions are similar, but insertion works better. You move the cursor to the desired position and hit the Ins key. This puts you into Insert mode (the program is normally in Overwrite mode) and breaks open the text to give you running room. You then crank in as much new text as you like. When you're finished you hit the Ins key again, which takes you out of the Insert mode and automatically reformats the text.

To delete text, you have to deal with "shading," an important concept in *Samna*. Shading is the way you indicate which part of a document you want to work on, and whatever you shade goes into inverse video. You put the cursor at the beginning or end of a block of excess text and hit the Del key, which puts you in Delete mode. The program then asks you to shade the text you want to get rid of. The cursor control functions work normally, but everything the cursor moves over is shaded. If you want to delete the sentence you just typed, you hit Del, shift-Sentence, and then Del. The shift-Sentence combination shades the previous sentence, and the second Del eliminates it. It also gets you out of Delete mode and reformats the text. Shading can be pretty flexible; you can shade any combination of words, lines, and paragraphs, or an entire file. You can even unshade by reversing cursor direction while still in Delete mode.

This procedure is fine for lengthy deletions but cumbersome for short jobs. If you don't like the word you just typed, it's nice to be able to blast it with one or two keystrokes. *Samna* makes you use four.

And in *Samna*land, deletion is forever. Unlike some more forgiving word processors, *Samna* doesn't hang on to your last deletion or two.

Block moves and copies work much like block deletions but the command structure is different. You hit the Do key

Unlike some more forgiving word processors, *Samna* doesn't hang on to your last deletion.

(F9) and then the letter c for copy or m for move. You shade the text you want to move or copy and hit the Enter key. *Samna* then grunts and moans while it writes the text block out to disk in a file all its own called TEMP. Then you put the cursor where you want the text to go, hit Ctrl-Ins and then Enter, and the text appears in its new slot. This is an easy enough routine, but it's slow. You'd think that with 192K of memory to wallow around in, *Samna* could move a block of text without shunting it out to disk. And when that text comes back in from disk it takes its time, rolling onto the screen so slowly you can read every line.

The same Ctrl-Ins routine is used to bring chunks of text from disk into the file you're working on. Instead of just hitting Enter (which will read in whatever was written out to the TEMP file in the last block move), you enter the name of a file on disk. The file is then read into your document—slowly, of course.

Born to Format

Samna is committed to onscreen formatting and it is good at it. The whole right column of function keys is devoted to format. If you want to underline as you type, just hit the Underline (F2) and Enter keys. You are now in Underline mode. If you want to turn it off you hit shift-Underline and then Enter. If you want to under-

line something you've already typed, position the cursor next to it and hit Underline. Then shade whatever you want underlined (using any of the cursor control keys) and hit Enter. If you want to remove underlining, hit shift-Underline, shade, and then Enter. The entire column of keys works the same way; they're all easy to learn, and easy to use.

Margins are likewise strictly an onscreen affair. They can be reset at any point in the text but they take up useful space and give the screen a bizarre, cluttered look. Once you've set your margins, it's a good idea to stick to them. Changing margins is a little like deleting an entire document and then replacing it. In order for the program to understand that you want margins changed for the whole thing, you have to shade the entire file. Fortunately, you can do this with one keystroke (the File key), but it takes a while to turn an entire document into reverse video. The program grinds through the document resetting the margins and then it grinds through again to realign the text. It takes *Samna* more than a minute and a half to change margins on a file that is not even 1,000 words long. If you needed to reformat a really long document, you'd have time to walk the dog or make yourself a ham sandwich.

Samna has several other format features that cannot be represented on screen, but that could be very useful, such as variable pitch and line spacing. By using the Mark key (ScrollLock) you can mark any point in the text to change from, say, 10 to 12 pitch (if your printer can handle it) or from double space to single space. These commands don't affect the appearance of the text on the screen but the results will be properly printed out. Marks for pitch and spacing are not usually displayed in your text but can be turned on by a special command if you need to be reminded of what you did.

Samna uses the Tab key for some handy onscreen formatting as well. Ctrl-Tab will set a temporary left margin at the tab point and it will remain effective until the

SAMNA WORD

next paragraph break. This is a clever way to indent a piece of a document without setting up a new format line. *Samna* also allows what it calls "numeric tabs" for typing columns of numbers. Once you have set one up and tabbed to it, any characters you type will be inserted backwards—towards the left margin—until you type a period. Subsequent characters will then move left to right. This slick bit of programming makes it a breeze to keep columns of figures straight.

You also use the Tab key to set GOTO marks, points in your document to which you can send the cursor with a single command. If you had a form letter you wanted to personalize, you could put Go To marks at the beginning of each section that had to be customized. Once you had the original form letter on screen, you could whiz right to each spot that needed to be personalized.

Bag of Tricks

Samna offers the usual bag of tricks we have come to expect from word processors. It has a good search and replace command that can replace automatically or pause for your instructions. Best of all, it realigns text automatically, so if you replace *circumlocutory* with *wordy* you don't have to go back to straighten things up.

Other nice touches are super- and subscripting (if your printer is up to it) and an option to embed nonprinting messages to yourself in the text. You can also edit while printing, though a complex editing command will temporarily halt your print job. *Samna* is good at soft hyphens. In Hyphenation mode, the program will cruise through the text, hunting for over-long words that have wrapped onto the next line. When it finds one it shades the letters that could fit on the line above and lets you decide where to break the word. If you rearrange the text later, *Samna* remembers that these are just soft hyphens and puts the words back together if necessary. Anything you actually type with a hard hyphen will stay hyphenated.

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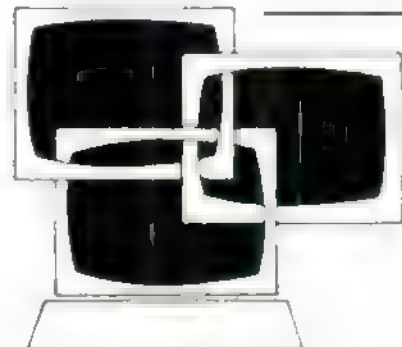
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The program also has an overstrike command that's useful for printing foreign characters and strange new symbols. I have always wanted to see how the tilde (~) would look, floating over an *n* the way it does in Spanish. Alas, the tilde is the one character on the keyboard that *Samna* chokes on; it refuses to display it and accuses you of issuing an illegal command. The folks at SAMNA Corporation assure me that this oversight has been corrected in a forthcoming release.

Samna is pretty good at footnotes. You put the cursor where you need the note and hit Mark, f (for footnote), and Enter. A window pops open at the top of the screen and you do your *Op. Cit.* routine. When you're done, you close the window and all that remains in your text is a footnote mark. Notes will tag along if the text block is moved and will appear, properly numbered, at the bottom of the page or at the end of the document. A quibble: *Samna* doesn't seem to know that a period always follows the footnote's number. Since the program numbers the notes for you anyway, it could have just as easily put a period after the number. Since it doesn't, you have to begin the text of each footnote with a period and several spaces. Another quibble: The move-by-sentence command is fooled by footnote marks at the end of sentences. The command will send the cursor prancing past them to the end of the next sentence.

Footnote-type windows are also used for footers and headers, which can take up as many lines as will fit into your top and bottom margins. They can be modified for even and odd pages, and you can even put up to 30 entirely different headers and footers on different pages of a document.

You can also display two different documents in separate windows. Any file that is on your current working disk can be read into the second window and you can do normal editing on either one of them. But any operation that uses windows—including footnotes, headers, or footers—must wait until you have gotten rid of one

of the documents.

Double-Threat Printing

Samna has two different print modes. The first and simplest is a modified screen dump; it sends one page of the onscreen document to the printer. It won't do footers, headers, or footnotes or number the page, but it's convenient for short documents.

For serious printing you must print from a file on disk. The program lets you set up default printing parameters, but each time you print from disk it gives you the option of changing them. Thus you can decide for each document if you want to start printing at a certain page, skip certain pages, justify, print page numbers, or put footnotes at the bottom of the page or at the end of the text. If you want to stick to the usual format, you just hit the Enter key when the print options menu comes up. This is a handy arrangement, but it would be handier still if the cursor would move from each menu option to the next as soon as you entered new information. Most of the time you have to enter only one character of information per menu item, but you still have to press the Tab key to move on to the next item.

Samna is a fervent believer in onscreen page breaks. As you type along, they appear automatically when you have filled up enough lines. The page breaks are great, brutish things that lie across your text like corpses. Page breaks can be helpful, but there's no reason why they can't be subtle, and no excuse for them to take up two full lines of your precious screen.

But once the *Samna*folk took the page break plunge, they made the most of it. You can repage your document at any time to eliminate widows and orphans (first or last lines of paragraphs printed on first or last lines of pages) or to begin every page with a new paragraph. You can even work these options into default printing parameters. *Samna* also allows you to protect elements such as charts or long quotations against page breaks by putting

special brackets around them.

Unfortunately, I wasn't able to see all these wondrous features in action because the print program released with Version 1.0 doesn't work properly with IBM's dot-matrix graphics printer or with an Epson printer with Grafrax. Never mind that they are probably the two most popular printers for the PC. It's just another venomous bug to be eliminated in the forthcoming Version 1.1.

Forming Form Letters

The *Samna*folk tell me that while they are working on that one they will also teach their program how to do something any high-priced package should be able to do with its eyes closed: create form letters. Believe it or not, even with its \$450 price tag and 192K of memory, *Samna Word* still has to grunt and strain to turn out a simple form letter.

There's a simple reason for this: You can't rename a file that you've already got in the editor. Why does this matter? Well, imagine that you have set up the master version of a letter that you want to mail to a thousand people. You have left several spots blank so that each copy of the letter can be personalized. You have even tagged these blank spots with *Samna Word*'s GOTO markers so that you can tab immediately to the parts you want to fill in. You haul that file into the editor, you fill in the blanks and you're ready to print. The catch is that you have to save the file in order to print it, and when you save it, it will write over your nifty master version. Since you can't rename the filled-in version so as not to overwrite the original, you're stuck. The first time you save a filled-in version of the letter, you will destroy the master form.

There is a way out, but the manual passes over this trouble spot in complete silence, and you have to figure it out for yourself. When you are ready to save and print the filled-in version, slip in a different data disk. After you've printed the first letter and you want to read the master version back into the editor so you can write

SAMNA WORD

your next letter, switch disks again. *Samna*'s inability to rename a file that's in the editor has other consequences. If you have worked on a document for a while and decide that you want to keep both the old and new versions, you're out of luck. When you save the new version you lose the old one, unless you want to juggle disks some more. Of course, Version 1.1 is supposed to make all this easier.

But while I'm on the subject of inexplicable defects, I might mention that you can't exit to DOS from the program; you have to reboot to run anything else. If you've been working with RAM drives or a print spooler you can kiss them goodbye. And if you make the mistake of trying to boot *Samna* in a system without enough memory, you get an undocumented error message and a system hang. You have to reach for the red button to get out of this one. The documented error messages are arranged in the manual in some utterly unhelpful, non-alphabetic order.

Another weirdo feature: If you set your right margin anywhere past column 76, the whole screenful of text will lurch to the left when the cursor approaches the right margin. That makes sense when line length is greater than 80 characters (*Sam-*

na lets you have margins as wide as 250 if you want them), but not when all the text could fit on the screen. Likewise, when

Samna can't do
indexes, tables of
contents, and
special fonts such
as italics and
compressed type. It
can't tell you how long
your document is.

you have wide margins and you want to send the cursor up one page, your text will do a crazy side-to-side hula as it wriggles up the screen. This must be seen to be believed.

Don't ASCII

For added eccentricity, *Samna* doesn't even save things in ASCII. Instead, it saves documents in a format so obscure you can't even examine them with the TYPE command in DOS. *Samna* does

give you a translation utility for ASCII to *Samnaland* and back again. However, the ASCII-to-*Samna* translation process is very slow, and every line ending in an ASCII file shows up as a carriage return in the new *Samna* version. You have to trudge through the file and weed out every useless carriage return before you can reformat. The *Samna*-to-ASCII translation process is faster and cleaner.

Finally, there are several important things that *Samna* can't do: indexes, tables of contents, and special fonts such as italics and compressed type. It has no way of telling you how long your document is. It is copy protected so you can't run it out of a RAM drive. We all have preferences, but wouldn't you trade the ability to always set page breaks at the ends of paragraphs for a chance to print italics?

Samna is certainly not junk. I wish all word processors had numeric tabs, could do strikeouts, and handled soft hyphens as well as this word processor does. But the whole package just doesn't add up. New versions will no doubt clean up some of the mess, but who wants to wait? For the price of *Samna*, you can take your pick of the best programs on the market. Don't pick this one. ■

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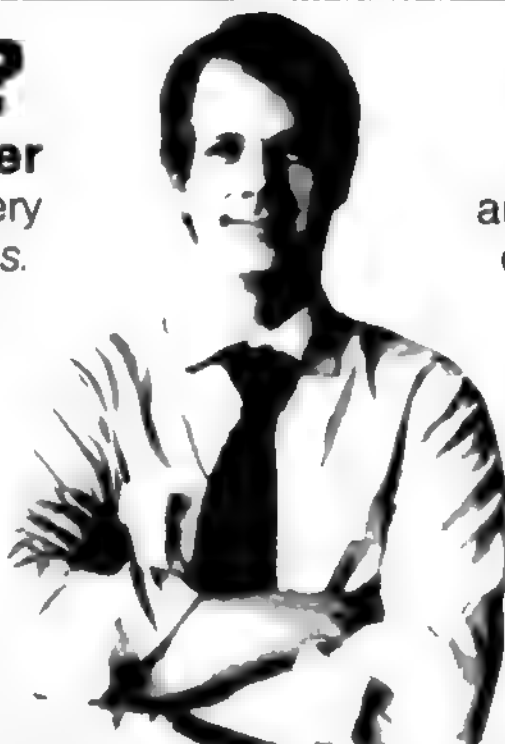
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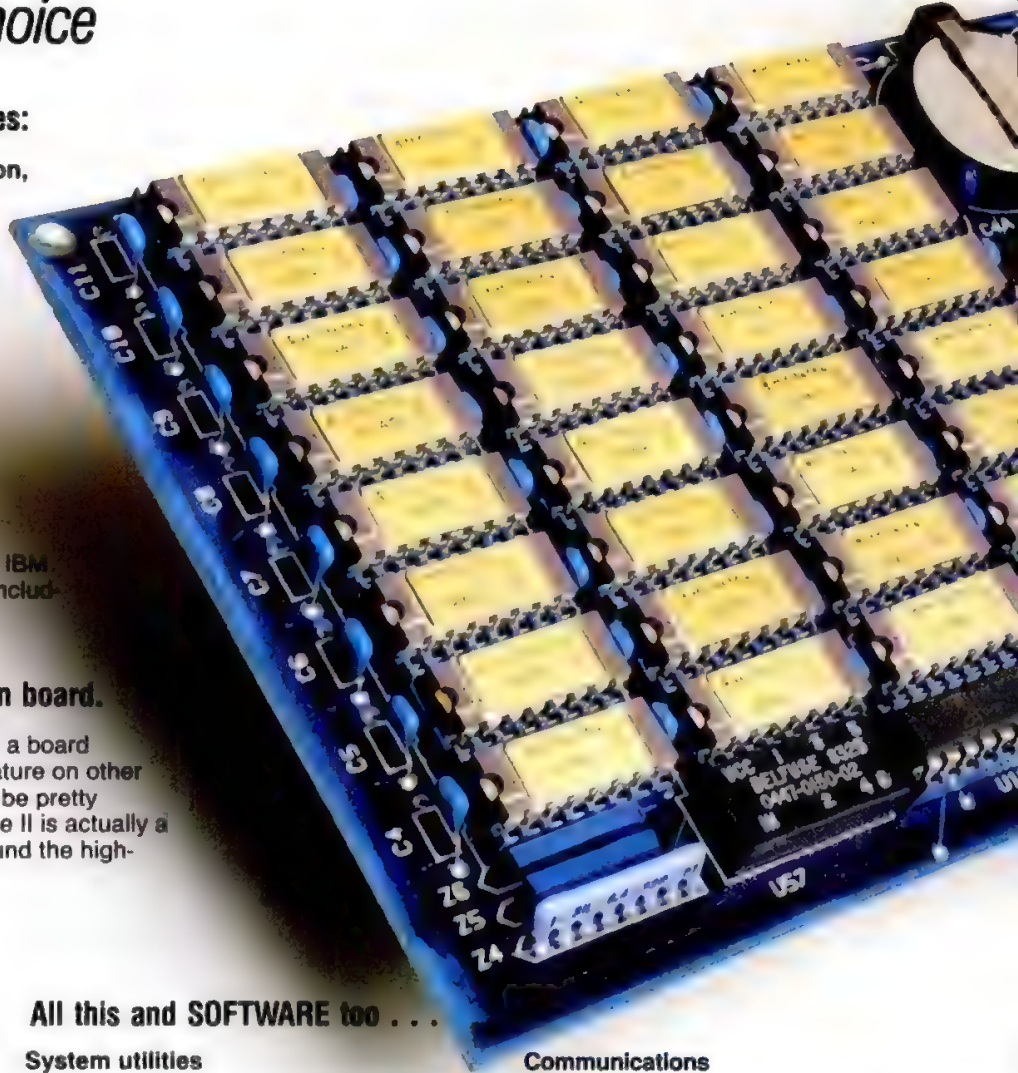
Print Buffer/Spooler: a TRUE print spooler: the Z-80 buffers and manages printing independent of your PC. Unlike other so-called "spoolers", this one won't stop your printer or slow you down when you start another job.

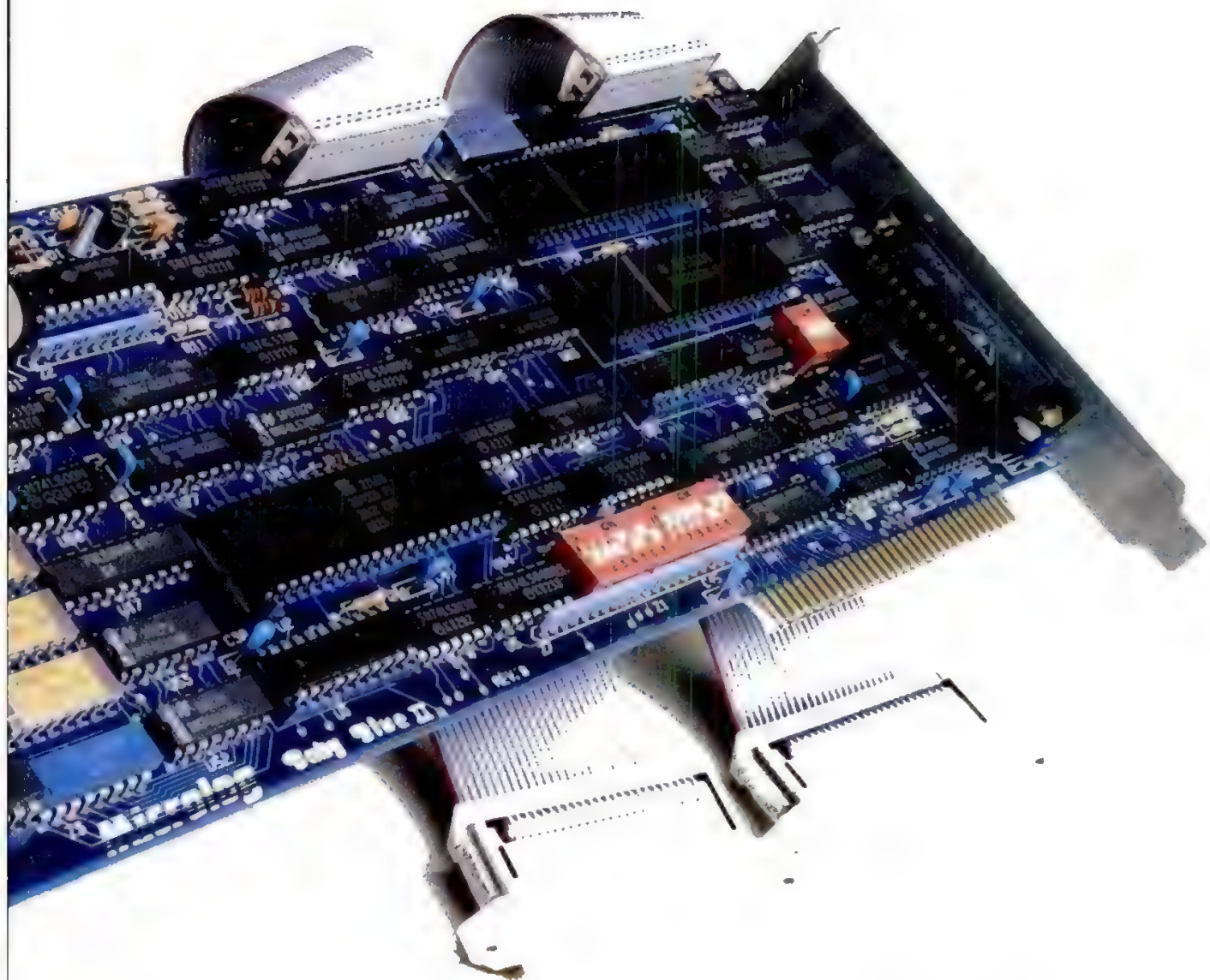
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CIRCLE 313 ON READER SERVICE CARD

A MicroPro Family Portrait

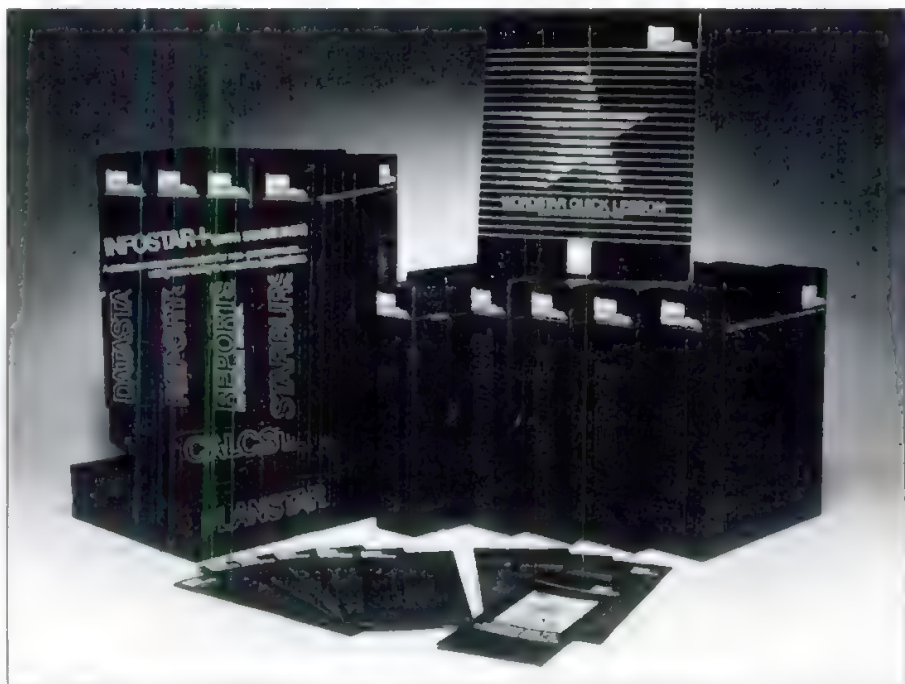
If MicroPro means only WordStar to you, perhaps it's time to take a closer look and get to know some of the other rising stars emerging from this versatile software family.

There's more to life than *WordStar*. The package that has made MicroPro famous has software siblings to take care of just about all your applications.

The members of MicroPro's family of software can work independently or, using the *StarBurst* integrator and menu system, together. One of this company's latest products, *StarBurst* integrates the MicroPro products and even ties other vendors' packages to the integrated system.

The Family Star

It would hardly be appropriate to start a voyage through the MicroPro family with any member except *WordStar*. This word processor has been extremely popular on both the new 16-bit personal computers and the older 8-bit machines. *WordStar* users are probably among the most loyal fans, with good reason. *WordStar* has given its users enormous capabilities right



A look at the MicroPro family of star performers.

from the beginning, and few word processing programs have carried the art further.

Almost all of MicroPro's programs are built around the Ctrl key. Once you have mastered the Ctrl sequences, they are basically the same throughout the entire family, so you can learn the other programs fairly quickly. Some of the screen and cursor movement Ctrl sequences can also be performed with the PC's cursor and page direction keys. There are two exceptions to the Ctrl sequence rule. *CalcStar* uses semicolons and prompts, and *PlanStar* requires you to enter from one to three letters of a command—just enough to identify it.

WordStar's opening menu allows you to perform some system and file maintenance, initiate one of the *WordStar* options (like *SpellStar* or *MailMerge*),

User-defined functions can invoke special printer features not included in WordStar.

temporarily run an external program, or exit back to the PC-DOS prompt. The file maintenance commands are used to print, rename, copy, edit, or delete a file. You can also set the help level at the opening menu to determine how much onscreen help you get while you are editing. A first-time user would most likely select level 3, which lists most of the pertinent commands at the top of the screen while you are editing. If you are experienced, you can set the help level to zero and use the entire screen for text.

WordStar is packed with many cursor movement commands: right or left one character, up or down one line, right or left one word, tab right, top or bottom of screen, top or bottom of file, right or left end of a line, top or bottom of a block of

text, jump to next misspelled word, and jump to a special marker (0 through 9). You can also scroll the screen in either direction, one line or one screen at a time or continuously.

WordStar offers many formatting commands to make the text look exactly like you want. You can set variable tabbing, paragraph tabs, center text, set left and right margins, release margins, set and clear tabs, justify the right margin, set line spacing, display page breaks, display column ruler, wrap words, display print commands, call for hyphen help, and reformat a broken paragraph.

Deleting and inserting text is a breeze with *WordStar*. The commands allow you to delete a character, a word, a line, part of a line, a block, or an entire file with just two or three keystrokes. Inserting text is a simple matter of making sure that the Insert mode toggle is on. This toggle allows you to insert or replace text. Finding and replacing text is also easy.

Another group of useful and powerful commands are the File and Block operations. You can set column mode on or off for entering columns of numbers or text, set or remove special markers (0 through 9) that you can quickly jump to on command later, display the current directory, and select a block by marking the beginning and end of that block. Once you have selected a block, you can copy, move, or delete it or copy the block into another file.

WordStar performs boldfacing, underlining, strikeouts, double strikes, subscripts, and superscripts. You can insert phantom spaces, rubouts, printer pauses, ribbon color changes, and select pitch and line heights. Once you are experienced enough, you can set up your own user-defined functions that can invoke some special printer features not included in *WordStar*. Some of the real power of this word processor is in its dot commands, with which you can set bidirectional printing, microjustification, page offsets for the left margin, character width, non-printed comments, conditional page

breaks, footers and headers, footer and header margins, line heights, top and bottom margins, page number printing (on/off), new page number, column-to-print-

StarBurst integrates the MicroPro products and even ties other vendors' packages to the integrated system.

page number, subscript/superscript roll, and paper length. What do you think? Is all that enough for you?

I just gave you a whirlwind tour through *WordStar*. The important thing to know is that *WordStar* works well and without glitches. (For a more comprehensive look at *WordStar*, see "Why We Like *WordStar*," *PC*, Volume 2 Number 6; "WordStar 3.24 and 3.3: MicroPro Does It Again And Again," *PC*, Volume 2 Number 1; and "The PC Gets *WordStar*," *PC*, Volume 1 Number 7.)

Close Relatives

WordStar's closest relatives are its add-ons, *SpellStar*, *MailMerge*, and *StarIndex*. *SpellStar*, as you might expect, gives *WordStar* the ability to check an entire document for spelling errors. You can check the document against a standard 20,000 word dictionary or any specialized dictionary that you create or buy from another source. All errors are marked in the text for later review and correction. After you have run the text file through the speller, you can go back to review any marked words that the speller did not recognize. You can fix the spelling, ignore the word if it is okay but not needed in your dictionary, temporarily bypass the word but leave it flagged, add the word to the main dictionary, or add the word to the supplementary dictionary.

SpellStar also includes commands to delete from or add groups of words to your

dictionaries. The program always gives you a report of how many words were flagged after a document has passed through the speller, how many words were checked, and other status information. The dictionary maintenance section gives you a status report of the current number of words in the dictionary and how many were deleted or added.

MailMerge is a specialized text-printing program designed to work with *WordStar*. Together the two can create personalized form letters, contracts, multiple files printed as one, and other documents that need to have data merged with text. *MailMerge* can take data from one of three sources and merge that data into text created by *WordStar*. You can perform conditional printing based on the value of the merged data. The data to be merged can be created either by *WordStar* (or *PlanStar* or *CalcStar*), by the operator via the key-

board, or from a command at the top of the text file.

MailMerge has commands for displaying messages and prompting for variable data. You can insert files one after another for multiple file printing, which can be handy for printing a book with many chapters that are filed separately. With the conditional commands "if" and "except," you can choose which form letters or address labels to print. For instance, if you wanted to print personalized letters and labels for all your Chicago customers only, you would only print if the City variable equaled "Chicago." Data being inserted into a formatted, justified paragraph will automatically be reformatted so that the letter is printed correctly.

The last *WordStar* add-on, *StarIndex*, is a little more esoteric, but it's very valuable to writers creating documents with many chapters, sections, or tables. It lets you mark chapter headings, table titles, and general entries so that you can create and update tables of contents, lists of tables, and indexes automatically. You can choose exactly which titles should be included in a table of contents and which ones should not. For instance, a government document uses the indented number system: 1. major topic, 1.1. major section, 1.2.3. minor section, 1.2.3.2. minor paragraph. A writer following this format might want just the major topics and section titles to be included in his table of contents. *StarIndex* allows you this choice.

It is easy to design outlines, list of figures, index pages, and appendixes. You can control the printing of these indexes with boldface, double strike, elongated, underlined, and spaced commands. Upper and lowercase Roman numerals can be used to number chapters. You can decide which level or sections should have upper and lowercase letters, and you can embed chapter numbers in page numbers. There are many different numbering schemes to pick from.

Good with Numbers

The complete set of *WordStar*, *SpellStar*, *MailMerge*, and *StarIndex* can be purchased as the *WordStar* Professional package. The combination of the four programs offers the writer a powerful word processing system.

Those who consider "MicroPro" to be synonymous with "WordStar" may find it hard to believe, but the company manufactures financial software, too. If you have ever worked with either *SuperCalc* or *VisiCalc* then you have a good idea of how *CalcStar* works. *CalcStar* is a traditional spreadsheet built around a matrix of rows and columns on the display screen. Figure 1 shows the initial screen you see when you first start up *CalcStar*, and Fig-

ure 2 shows the two screens of information you see when you request help. This package uses fewer control sequences than any of its siblings. Most commands are initiated by first pressing the semicolon (;) key and then one letter for the command you want. For example, to see the help screens

WordStar, SpellStar, MailMerge, and StarIndex can be purchased as the WordStar Professional package.

shown in Figure 2, you press ;H.

CalcStar displays five lines of status information at the bottom of the screen, which is also the area in which you enter formulas, data, and commands. When the program prompts you for parameters after you enter a command, it displays the text at the bottom also. The status area continually shows you your position within the spreadsheet. There are 255 rows by 127 columns (the rows are numbered 1 to 255, and the columns A to Z, AA to AZ, through DA to DW). Cells, or data areas, are accessed and referenced by their row/column intercept—for example, A1 or BD144. The status area also shows you the current contents of a cell, which can contain data, formula, or a blank.

CalcStar has a multitude of commands to create and modify your spreadsheet or worksheet. The ;C command copies the contents of a cell to another cell or to a range of cells. (A range of cells is a group of cells designated by referencing the top left cell and the bottom right cell to define the cells in between.) The delete command erases an entire row, a column, or the whole worksheet. The precision of data, the column width, and the direction in which the cursor moves can all be set using the format command.

MailMerge and WordStar together can create personalized form letters, contracts, and other documents.


```

- Cursor Movement - :      - Commands - : followed by : - Misc -
<CR> Right      :A Auto   F Format   M Merge   R Recalc * Extend :B Curs Pos
^S Left  ^D Right :C Copy   H Help    O Order   S Save   = Lock   :? Evaluate
^E Up    ^X Down  :D Delete I Insert  P Print   W What   ? Space :^ Data Togl
^Z Col A next row :E Edge  L Load   Q Quit    S or <TAB> Goto  ^ESC>Cancel
Col>:A          'B          :C          :D          :E          :F          :
Row>-----
1: >          <
2:
3:
4:
5:
6:
7:
8:
9:
10:
-----
[          ] cursor: A1      current: A1      L-R
current!!      type: text:left justified
data !!      contents:
              edit:

```

Figure 1: The initial screen you see when you boot up CalcStar.

```

----- Help page 1 ----- Hit <RETURN> to continue
-----Main entry mode-----

Cursor is controlled with keys E, D, X, and S with the <CNTRL> key held down.
Direction is up, right, down, and left in that order. <Control Diamond>
<RETURN> moves the cursor right if no data has just been typed.
<CNTRL>Z moves the cursor to the next row, first column.

Data entry: digits 0-9, +, - signal numeric entry.
             alphabetic characters or blank signal text entry.
             /, followed by R, C, or L justifies text right, centered or left.
             ^ is used to switch between text and numeric if needed.
             /= duplicates entry across column. /P causes page break for print.
             ! sets special entry mode for arithmetic modification of input.

Equations may contain numeric data, cell references, and functions.
             four-function arithmetic (+, -, *, /) may be used with any of these.
             @ refers to current cell location. Type one character and then
             move cursor to collect cell references without typing them.
             ! following a cell reference holds ref constant in relative copy.
             functions include: sum, avg, cnt, abs, exp, log, ln, min, max,
             regr, slope, proj, depd, sqrt.

----- Help page 2 ----- Hit <RETURN> to continue
-----Extended commands-----

these commands are accessed by hitting the 'j' key
Auto      enter Automatic entry mode. <ESC> will abort.
Copy      Copy a (range) entry to another (range) entry
Delete    Delete a row, column, entry or the whole array
Edge      set the window top left corner to the cursor position
Format     change column size or precision under cursor
Goto      move cursor to a specific column and row
Help      display this information
Insert    Insert a row or column into the array
Load      Load a file into the array
Merge     overlay file onto array
Order     Change the evaluation (column/row) order of the array
Print     Print a report
Quit      exit the report generator
Recalculate recompute entry at cursor or whole array in current order
Save      Save the array to a file
What      if text, prints 1st column & row entries of cursor position
?         print approximate storage space in terms of entries
=         lock column A and row 1 onto display
*         Switch between 10 (with menu) and 15 row screen display

```

Figure 2: Two CalcStar help screens. If you're familiar with WordStar Ctrl sequences and with the basics of VisiCalc, CalcStar should be a breeze.

You can insert blank rows or columns with the insert command. If headings for rows and columns have been entered (for example, first quarter, second quarter, and so on), the what command displays these headings for the current cell in case the row and column headings are not shown on the display at that time. You can only look at a certain number of rows and columns at a time and this "window" moves around the worksheet, showing you the section you are currently working on. If you happen to be near the right bottom section of the worksheet and the titles and headings are located near the top left, you will not be able to see those headings without using the what command. The lock command protects selected cells from being modified inadvertently.

There are text formatting commands that allow you to title your rows and columns. You can left, right, or center justify text in any cell. You can also enter any constant data or formulas into cells and the formulas can reference other cells for data. There are numerous commands that allow you to quickly move to a particular cell. The GOTO command takes you to a selected cell immediately. The order command sets the direction of data/formula entry, which can be left to right, right to left, bottom to top, top to bottom, or a special direction and order you specify using the format and auto commands. The edge command positions the current cell in the upper left section of the window.

CalcStar includes all functions you expect from a spreadsheet. There are the normal arithmetic functions; formulas that work on ranges of cells like sum, count, average, maximum, minimum, square root, logarithm, natural logarithm, absolute value, exponential, or normal exponents; and some conditional formula commands to calculate cell values differently depending on some initial values. The if/then and the if/then/else commands give the spreadsheet flexibility.

Usual and Unusual

CalcStar also includes four commands

not normally found in spreadsheets. The *regr* command calculates a linear regression line based upon a range of cell values; *proj* takes a value and inserts it into the calculated regression line to compute a

The lock command protects selected cells from being modified inadvertently.

projected value; *depd* works in a similar manner; and *slope* returns the value of the regression line. These four linear regression functions are helpful for determining future values based on past trends. You enter as much past sales data as possible and then ask *CalcStar* for the projected sales in December 1985, for example.

Once you have a completed worksheet with row and column titles, data, and formulas, you can print the worksheet to the printer or save it in a file. The *merge* command lets you combine another worksheet file with the one you are using. You have several options in saving the worksheet. You can save it as a plain worksheet for later use in *CalcStar* or save it with the .TXT extension, which allows *WordStar* to access it. You could then include the finished worksheet in reports or add additional text to the final copy. The last option lets you save the file with a .DTA extension, so that *MailMerge* and *DataStar* can use it as a general data file. Each row in the worksheet becomes a record and each cell becomes a field. Files with .TXT and .DTA extensions cannot be reloaded into *CalcStar* later.

Standard *VisiCalc*-type spreadsheet, right? But the *PlanStar* spreadsheet is another story.

PlanStar reminds me of Comshare's *Target Financial Modeling* spreadsheet (see "The Ultimate Spreadsheet?" PC, Volume 1 Number 11). I like *Target* because it lets you create worksheets in

straightforward English, and *PlanStar* is the same type of spreadsheet. In both of them, you first name the rows and columns with logical names and then reference the data with those names. For example, instead of referring to a cell as A22, you could call it Sales/1984. A worksheet with English titles is useful to the financial planners for whom spreadsheets were originally meant.

A PlanStar Project

PlanStar builds its spreadsheets around projects, groups of up to 9,999 stored instructions that specify the row and column structures, the calculations, how the data is to be reported, and how to create some limited graphical reports. The instructions must be entered in that order.

You can have up to 999 worksheets within each project; the columns, rows, and calculation are all the same but the data is different for each worksheet. You can thus separate reports by departments, product, or areas and *PlanStar* can combine any or all of the individual worksheets into a consolidated worksheet for final results. You can perform mathematical functions on entire worksheets or sections of worksheets to create the consolidated report. For example, to consolidate four income statement worksheets for a company's four regions, the command would be:

```
Worksheet 5 =
CONSOLIDATE Worksheets 1
thru 4.
```

(continued)

```
100 ; project Income
120 columns Year1 (1984) Year2 (1985) Year3 (1986)
130 columns Total
140 rows Sales Prices SProfit (Sales Profit) Expenses GProfit (Gross Profit)
160 rows Taxes NIncome (Net Income)
1000 ; calculation section
1020 SProfit = sales * prices
1030 expenses = 45% of sprofit
1040 gprofit = sprofit - expenses
1050 taxes = 40% of gprofit
1060 nincome = gprofit - taxes
1100 total = sum of year1 to year3
1120 cons den total
1140 prices = NA
2000 ; report section
2020 report 1
2040 decimal places 0
2060 page depth 60
2080 column width 10
2100 center "Project Sales and Income for the next 3 Years"
2120 line
2140 show sales to taxes
2160 line
2180 show nincome
2200 underline nincome with "="
```

PlanStar 1.0 : Report 1 Project INCOME-1 : Page 1

Project Sales and Income for the next 3 Years

	1984	1985	1986	Total
Sales	1000	1500	2500	5000
Prices	10	12	15	NA
Sales Profit	10000	12000	37500	65500
Expenses	4500	8100	16875	29475
Gross Profit	5500	9900	20625	36025
Taxes	2200	3960	8250	14410
Net Income	3300	5940	12375	21615

Figure 3: A simple program in *PlanStar* and the report it produces. *PlanStar* is an intriguing and powerful spreadsheet with unique capabilities.

MICROPRO

The row, column, and worksheet definition section sets up titles of up to 16 characters for each. If you need more characters or want a different title printed on the report, you can set up an EV (extended version) name of any length for the row or column. The use command allows the entry of rows and columns from other worksheets into the current worksheet.

The next section of the project instructions contains the calculations on the rows, columns, and worksheets. You can perform amortizations, mortgages, averages, depreciations, cumulative totals, value discounting, internal rate of return calculations, maximums, minimums, inflated values, moving averages, net present value calculations, percentages, rounding, salvage values, and summing. That is quite an impressive lineup of features for any financial planner, and

there's more. *PlanStar* also performs linear regression, line fitting, and forecasting like *CalcStar*. If a function that you need is not available, you can call a BASIC program to do that calculation using the CHAIN command. When the BASIC program is finished with its calculations, control passes back to *PlanStar* and the spreadsheet continues from there.

There are commands to prompt for input data and parameters. Conditional calculations are possible with the IF commands. You can even jump to a different set of calculations with the "if . . . continue at xxx" command where xxx is the project instruction number you want to jump to. This is very similar to a GOTO instruction in BASIC. The "consider" command restricts subsequent calculations to certain rows, columns, or worksheets. The "consider all" command

reactivates all the rows, columns, and worksheets for calculations.

How Does It Look?

The next group of instructions describes how the report will look. Up to 14

PlanStar performs linear regression, line fitting, and forecasting like CalcStar.

reports can be defined for every project. This allows you to set up many different reports (such as cash flow statement, income statement, or change in financial position) from the same worksheet data.



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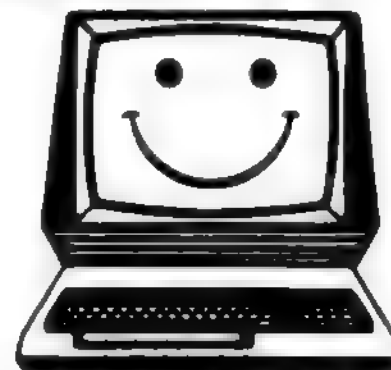
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There are numerous commands to align and center headings and subheadings. The show command specifies the rows and columns that will be shown in the report.

You have many options in deciding how the data will look in the printed report. Negative numbers can appear with a minus sign, in parentheses, or in brackets. The number of decimal places and column widths can vary for individual columns. Commas can be displayed in large numbers or left out. Page breaks and blank lines can be easily inserted in the report to make it more readable. You can underline or overline with just about any character you choose. For instance, you can underline all total figures with equal signs, producing the standard double underline for totals.

The last group of instructions is for

specifying an optional graphical representation of any selected data. You have the choice of line graphs, bar graphs, or segmented bar graphs. The graphics are very limited; they can be displayed on the monochrome monitor or printed.

PlanStar has an editor to modify the existing program. The instructions are all numbered, so to edit a sales calculation on line 789, you would enter E 789. The do command prompts you for the constant data to be entered into the worksheet, such as past sales figures. There is on-line help for almost all the commands in case you forget the syntax, but the commands are in simple English and very easy to learn and use. A typical program and the report it produces are shown in Figure 3.

There are two special "what-if" commands for financial planners, find and "sensitivity." The find command says:

FIND Sales GIVING Profit = 10000 in Year1.

The sensitivity command finds the change in a variable when a given change in another variable is known. For example:

SENSITIVITY of Revenue for 10% change in Price.

In this example, all the revenue figures are recalculated for a positive and negative 10 percent change in price. The worksheet data figures are not changed, but the results are stored in the special temporary worksheet, number 0. You can view these results and store them in a permanent worksheet if you wish.

CalcStar and *PlanStar* are the members of the MicroPro family that are good with numbers. Their sibling program, *InfoStar*, excels at organization—not sur-

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prisingly since it's a database manager.

An Information Star

InfoStar is actually made up of two dif-

ferent programs, both also available separately: *DataStar*, a data entry program, and *ReportStar*, a sorting and reporting program. *DataStar* incorporates Form-

Gen, a full-screen editor that lets you set up a data entry form and define the type of data to be entered in each field. *DataStar* then lets you enter information into the form generated by FormGen and sort, modify, input, delete, and review that information.
The first step in the database process is determining what kind of information you

The consider
command restricts
subsequent
calculations to
certain rows,
columns, or
worksheets.

are going to store and how many and what kind of forms you will need. The second step is to design the forms; this is where you use FormGen. You enter the form with the full screen editor, titling fields and placing them strategically on the form. Next, you define the attributes for each field. Each field can have several parameters to limit the type of information that can be entered into it. This keeps the entry errors down to a minimum. You are asked a series of questions about each field (see Figure 4). Figure 5 shows a completed form for keeping track of software. The lines that are made with stars indicate keyed fields that can be used for sorting later. You have to define at least one keyed field. The next stage is the boring one, data entry. Somebody now has to enter all the selected information into all the forms you have created.

There is nothing fancy about *DataStar*; it just allows you to enter, delete, modify, and print records for each form. Some of the entries might be derived from other forms, but most of the data will probably have to be entered. Once all the information has been entered, you can sort the records by the keyed fields.

CURSOR:

OTHER:

LIN=003 COL=008

NUM=001 LEN=040

POS=001 EDC=

RETURN=next item

^S=left char

^D=right char

^E=prev item

^A=previous field

^F=next field

^G=delete char

^U=insert char

^C=end definition

^R=start over

^Q=locate field

^J=more help

HELP SCREEN R

Title: *****

Field name:

Field order:

Key order:

Tie breaker field? (Y/N)

Refuse duplicate keys? (Y/N)

Copy attributes of field

Field derived? (Y/N)

Required? (Y/N)

Right justify? (Y/N)

Pad field? (Y/N)

Floating character? (Y/N)

TITLE

001

003

N

N

001

N

Y

N

N

N

CURSOR:

OTHER:

LIN=003 COL=008

NUM=001 LEN=040

POS=001 EDC=

RETURN=next item

^S=left char

^D=right char

^E=prev item

^A=previous field

^F=next field

^G=delete char

^U=insert char

^C=end definition

^R=start over

^Q=locate field

^J=more help

HELP SCREEN R

Title: *****

Verify field? (Y/N)

Check digit? (Y/N)

Range check? (Y/N)

Edit mask? (Y/N)

N

N

N

N

Figure 4: When you set up a file in InfoStar with FormGen, you design each field by answering a series of questions. All the questions have defaults to speed things up.

CURSOR:

DELETE:

INSERT:

OTHER:

LIN=003 COL=008

NUM=001 LEN=040

POS=001 EDC=

^A=left item

^E=up line

DEL=char left

^P=line buffer

^J=rotate help

^S=left char

^X=down line

^G=char right

^U=char right

^W=list form

^D=right char

^U=set/clear tab

^T=entire column

^B=entire column

^C=form done

^F=right item

^I=tab

^Y=entire line

^N=entire line

^K=toggle key

HELP SCREEN 3

SOFTWARE INVENTORY

Title: *****

Vendor: *****

Address: *****

City: _____ State: _____ Zip: _____

Phone: (____)____-____

Contact: _____

Type: *****

List Price: _____

Figure 5: A completed form created by FormGen, ready to receive information through DataStar. With ReportStar, you can then turn the information into a report.

From Field to Field

DataStar's commands let you move from field to field within the form, copy the data from the previous record, jump to previous or next record, and print the records in a list format or as they appear

You enter a field designator where you want the different records' fields to be printed.

within the form. You can also select Batch mode, which lets multiple operators enter information into the same form in a temporary file. The information is not entered into the permanent data file until another designated person checks the records and then "posts" the information into the master data file.

DataStar's partner, *ReportStar*, is composed of four different sections: RGen, REdit, FormSort, and Report.

The first module, RGen, produces a quick report from any data file you choose. RGen leads you through a series of questions in order to form a simple report, but you have no format control.

REdit is basically RGen with extended features. You can format the report exactly the way you want. With RGen, the records and the fields you select are printed in a format set by RGen; you have no choice in how the report looks. REdit gives you control. The technique for creating a report format is similar to the way you might format a report within *WordStar*, but you enter a field designator where you want the different records' fields to be printed.

You specify which data files and which records you will use for the report (for example, all records with the ZIP field = 00123). You can set up multiple conditions for qualifying records, and you can obtain record information from more than one data file. Now you are ready to create

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the layout for a customized report.

Family Features

As in *WordStar*, you can use boldfacing, underlining, double striking, overprinting, underscoring, subscripts, and superscripts. You can set the bottom and top margins, page numbers, page widths and lengths, character and line pitch, and bidirectional printing. You just use the cursor to move around and enter the fixed printout and then enter the fields where you want them displayed. After completing the layout, you can store, change, delete, and/or run the new report.

The Report module does nothing more than run the newly-created report layout. You can choose to send the report to the printer or to a file for later browsing.

The last module, FormSort, sorts a specified data file in any order you choose,

which allows you to create many different reports from the same report layouts. FormSort will use up to 25 different keys with a total combined key length of 120 characters. Besides sorting a data file and creating an index file, FormSort can also combine several data files into one. FormSort creates index files that generate pointers to each record in a data file. An index file is necessary if you want to look at specific records within a data file.

You must enter the input form definition file name (created with RGen) and output file name when you invoke FormSort, but this module doesn't prompt you. All the other modules do, and it's surprising that FormSort is different.

InfoStar's manuals are the worst in the bunch. The text is crowded onto the pages in small type, and there are few examples. The documentation needs work.

A Recent Addition

The newest member of the MicroPro family is the most interesting and useful for people who often use more than one application package. *StarBurst* allows you to integrate all the other MicroPro programs—and even some other vendors' software—under one common system.

The basics behind *StarBurst* are simple. You create a series of menus. The menu options may be specific tasks, like running *WordStar*, or they may be names of other menus with their own sets of selections. You are the system builder when you use *StarBurst*, and you can limit the subsequent users to choices that you specify. This is very useful in an office environment where you might want people handling only certain data files and doing only certain tasks. *StarBurst* gives you that flexibility. You can set up pass-

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words, and file integrity check programs and automatic file backups.

The first step in building a menu/task system is to create the master menu, which will be the initial menu for all users. Each

A menu choice that is not tied to a task is meaningless and useless.

item on the master menu can be another menu or a task. You create the menu on the screen with *StarBurst's* full screen editor, using special graphics symbols to jazz up the display if you wish. Once you have entered all your choices, you place the cursor at the beginning of each and link that selection to a task or another menu. You

can then go ahead and create the new task or menu or wait until you have linked all the selections and then go back and create all the other tasks and menus.

Building a task is similar to writing a program. There is help on the screen constantly, if you want it, giving you all the aid you need to create some very sophisticated tasks. Figure 6 shows a simple task—enter *WordStar* and edit a user-selected file. At the top of Figure 6 is a list of the different commands you can use to create tasks. Most of the command names give you a good idea of their functions.

The menu-building stage is very easy. It involves simply listing the names of the choices and any descriptive information you want to include and then linking those choices to a task or menu. All menu choices must eventually end in a task; a menu choice that is not tied to a task is

meaningless and useless. At any time, you can get a listing of all the menus and what tasks they are linked to if there are any unlinked tasks or menus, and if any tasks have inadvertently been linked more than once. Figure 7 is a master menu that I built to run several MicroPro programs and one outside package (Satellite Software International's *WordPerfect*).

StarBurst's documentation is the best of the family and comes with a very helpful tutorial and example files that make the program very easy to learn and implement.

Data Integration?

Some vendors have created truly data-integrated packages in which all of the individual programs draw on a common database. If you change the data in the spreadsheet, it should be changed when

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MICROPRO

you later access the database or graphics package. Some vendors just shift copies of the data files back and forth and leave the responsibility of data integrity and upkeep to you. MicroPro's programs are really

meant to be used separately but can be used together in some cases. For instance, if you define your fields correctly, you can create a data file with *InfoStar* and use the information in a *MailMerge* form letter.

```

<<< TASK BUILDING >>>
To display the : For statement help: type KEYWORD and ^JH | To Use this task
menu/task names : For template help: type KEYWORD and ^JT | (end Build): ^B
in this tree and : ASK ELSE MOUNT REPEAT
for special : CHECK ENDIF NOLIST RESET
Operations: ^O : CLEAR ENDREPEAT PAUSE RUN | To Quick
: COPY EXIT PROMPT SET | commands: ^Q
To Print this : DELETE IF REMARK SETSBODE | To file and exit
task: ^P : DISPLAY LIST RENAME STOPREPEAT | commands: ^K
=====
Prompt "Run WordStar wordprocessor and edit specified file. "
Ask for &NM& with prompt "Enter drive and name of file to edit (ex. C:\MYTEXT). "
Display " WORDSTAR "
Display ""
Display ""
Run ws &NM&
exit

ESC to previous menu ^J for more info

Tree=C:\MICROPRO Task=WORDTASK Line 1 Col 1 Insert
1INFO 2WRKSPC 3STHLP 4TEMPLT 5DONE 6PRINT 7SHOW 8FILES 9USE

```

Figure 6: Building a simple task with StarBurst. In this case, the task or menu option is to run WordStar. StarBurst is the newest member of the MicroPro family.

```

*****
v
v MicroPro Software Options v
v
*****

*****
Σ
Σ WordStar Run WordStar Wordprocessor Σ
Σ PlanStar Run PlanStar Spreadsheet Σ
Σ CalcStar Run CalcStar Spreadsheet Σ
Σ InfoStar Run InfoStar Database Management System Σ
Σ WordPerfect Run WordPerfect Wordprocessor Σ
Σ
Σ
*****

Choice:
Tree=C:\MICROPRO Menu=MAINMENU
^J for more info

```

Figure 7: A master menu created in StarBurst to integrate the various MicroPro packages and other vendors' products as well. StarBurst gives the user a great deal of control over the creation of menus and tasks.

Topic	Ease of Use	Documentation	Capability
WordStar	B	B	A+
CalcStar	B	B	B
PlanStar	B	A	A
InfoStar	C	C-	B
StarBurst	B+	A	B

Figure 8 - MicroPro's Report Card

Figure 8: A MicroPro report card. Most of the family members score high marks, but it's no surprise that WordStar tops its siblings. StarBurst runs a close second.

MICROPRO

You can also take files from the *PlanStar* or *CalcStar* and, with a special option, make them compatible with *InfoStar*. However, you can't take a file used by *InfoStar* and read it back into *PlanStar*. Be

MicroPro's programs are really meant to be used separately but can be used together in some cases.

careful and read the instructions when sharing data among the family members.

If MicroPro introduced a communications package, a graphics package, and a time management system, it would have the whole ball of wax for most office environments. A real integrator that created a true database sharing system would be nice,—though difficult. And MicroPro must be thinking along the same lines. It plans to have three new packages available later this year: *ChargeStar*, a graphics package; *ProSolutions*, a series of application templates; and *ProjectStar*, a project management system built around the GANTT chart concepts.

MicroPro has much more to offer than most people realize. Its bread and butter is still *WordStar* and its add-ons, but some of its lesser-known packages help to form quite an impressive group. I personally like *PlanStar*, *WordStar*, and *StarBurst*, in that order. The entire group is fairly easy to learn and use, although the documentation could use some help, especially for *InfoStar*. *PlanStar* and *StarBurst*'s documentation are done nicely. If I were marking a report card for MicroPro, it would look like Figure 8.

If the only member of the MicroPro family you've met is *WordStar*, it's time to introduce yourself to the rest of the clan. ■



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CIRCLE 108 ON READER SERVICE CARD



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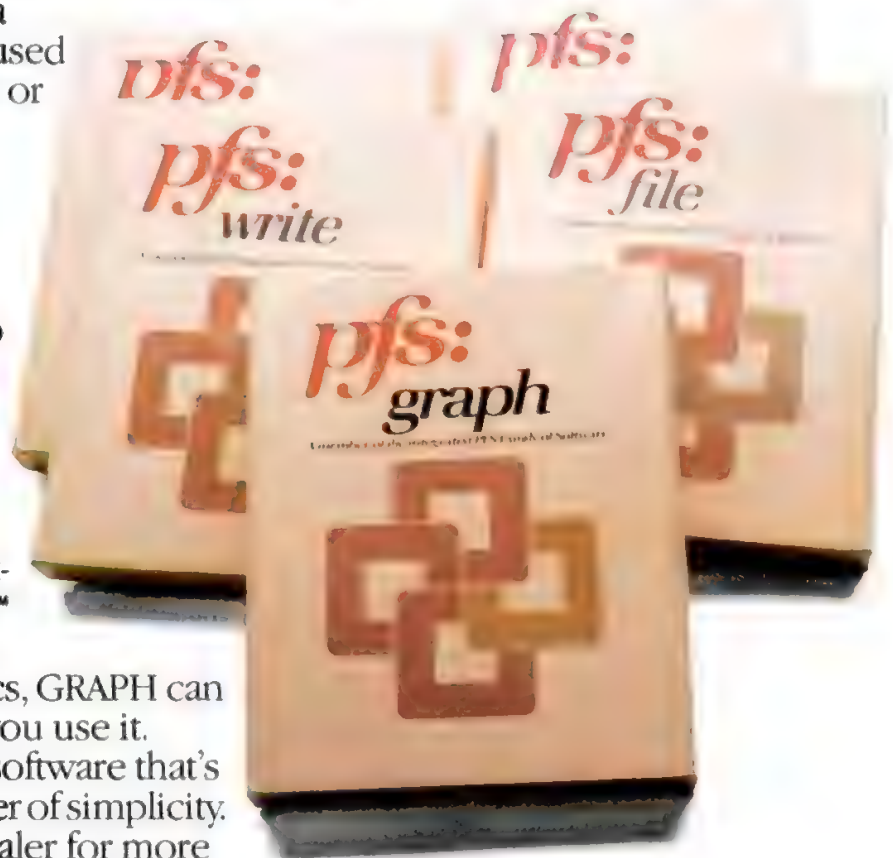
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CIRCLE 457 ON READER SERVICE CARD

Not Buying Is Also a Choice

Whether you buy a Commodore 64 or a PC with all the trimmings, the only right choice is one that fits the machine to your needs. Sometimes that choice is no machine at all.

One of the curses of my current vocation is all the attention I get from friends and acquaintances—and sometimes even strangers. Okay, okay, I like it, sure. Autographs are okay; they take only a second. But what I usually hear is “Will, what computer should I buy, huh?”

That’s a tough one.

The reason such advice is so difficult to give is twofold. First, people may spend their good money, and quite a bit of it, as a result of the advice I give them. Because individuals often don’t know what they really want or why they think they should have a computer in the first place, my advice becomes a very large component of their thinking and final decision. I hate to make a mistake, especially with friends.

Second, matching a computer (and, obviously, the software to go with it) to the specific requirements someone has dreamed up is not always practical. The researcher who needs a huge disk to store a million samples an hour, who wants the data reduced and reported within 15 minutes, and who has \$2,000 to spend, has a problem.

If these two obstacles to making a recommendation can be overcome, I frequently surprise the person seeking advice with an unexpected and unconventional answer. The first surprise is likely to be that I don’t always recommend IBM. The bigger surprise is that I sometimes recom-

mend nothing; that is, I advise the person not to buy a computer at all.

True Confessions

I’m going to tell you a true story. Shortly after the PC came out, I was called in as a consultant to an older gentleman who

A potential computer buyer should consider hardware and software that will offer a solution to an entire constellation of problems.

was considering the purchase of a PC. Actually, the gent’s friend wanted him to buy one and I detected a note of wanting to join the microcomputer “club,” a new variant on keeping up with the Joneses.

Anyway, my prospective client told me what he was thinking of doing with the computer. He had a manual system of record keeping that he had honed over several decades. He showed me page after page of ledger sheets with all of his finances (these were considerable) and explained how he or his secretary maintained the data. There were all kinds of

entries: a stock portfolio, bonds, loans, records of income, cash accounts, everything. It was neatly organized and quite clear. He showed me how he posted transactions and how often postings were done for each type of record. It was beautiful.

I then asked my prospective client what would happen if his secretary were hit by a truck. His answer was that it would not be a problem because he had designed the system and was able to post it himself. He also felt that a new secretary could be trained to perform the necessary duties in about an hour, with 2 or 3 days required for proficiency.

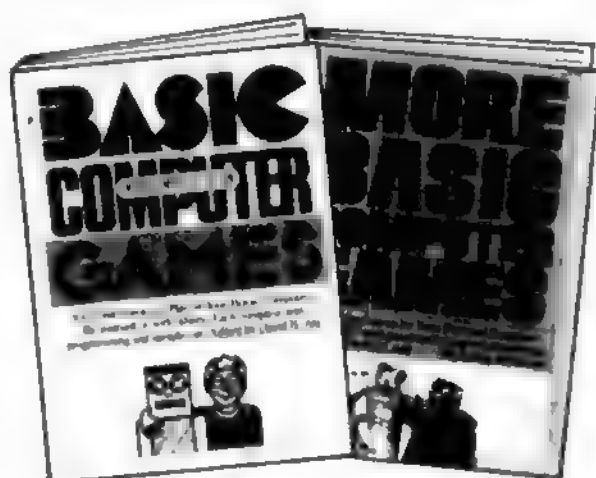
So I asked him what he wanted to do. His answer was that he wanted the manual system duplicated so that he would not have to learn anything new. He also wanted to maintain its simplicity so that he could effectively deal with the secretary-hit-by-a-truck problem.

His specification was easily within the reach of both the PC and me. I was candid about the initial expense. Cost of the PC: about \$5,000. Cost for me to do the work: at least the same, probably more. I also told him that it was unlikely that any software off the shelf would meet his criteria. (A salesperson had told him that *VisiCalc* could do most of it.)

So I told him to forget it. I explained the design of a system capable of doing

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PERSPECTIVE

what he wanted and how much time it would take to construct. I explained that the computer, no matter how well programmed, would require certain care and feeding (at the expense of his or his secretary's time). I explained my true opinion of the matter. His system was clean, efficient, and well understood. The computer would not be so. Forget it.

I'll always remember how his eyes lit up when I gave him that answer.

Making Do Manually

There are so many manual systems for doing things that are simple, direct, efficient, and understandable. Most computer jocks, including me sometimes, look at problems and imagine how they could be "solved" with a computer. What we actually think about is how a computer can be used to assist in the process. But a computer jock usually fails to recognize the issue of care and feeding mentioned above.

For the sophisticated computer user, adding a capability or function to the working set of tools on a computer is a relatively simple and painless task. Because we use computers so often and for so many different things, the overhead associated with an upgrade or addition fades as each new tool is added and we gain ever greater proficiency. This is not the case for the new or casual user, however. Quite the contrary, the overhead of using the computer to perform some simple task is not necessarily repaid by the additional efficiency of the program. Often the program itself does not offer an improvement in efficiency over the previous manual method, especially if the amount of data or the number of transactions is small.

Given this consideration, an expenditure of \$4,000 or \$5,000 for a computer to do a simple job is not justifiable, and in such cases I have consistently suggested to those seeking my advice that they delay.

The nature of the delay I suggest is important. It is not a delay for prices to

drop, for the technology to turn around, or for better software to emerge. It is a delay for the individual to discover other uses to which a new computer might be put. If the prices, technology, or software improve in the meantime, so much the better.

Although one application may not justify a computer, several might. As the number of uses rises, the amount of overhead per application drops proportionately. The expertise of the user can also be expected to rise, given the greater amount of time invested. All these things make the investment's time- and therefore cost-effectiveness improve, so the computer becomes a better and better buy.

More important, however, is the *thinking* time a delay introduces. A common problem with computer purchases is that the proposed solution often sounds better than it really turns out to be. A delay allows the potential buyer to more carefully examine the specific problem and analyze the proposed solution. Timely scrutiny can lead to a refinement of the problem, a better understanding of it, and a clearer view of the adequacy of the solution.

A delay also gives the individual time to look at the whole *collection* of problems the computer is meant to alleviate. This very important step will save time and money by letting the individual see the *relationship* among various problems. This, in turn, improves the ability of the buyer to select hardware and software that will offer a solution not just to individual problems, but to an entire constellation of problems. As a simple example, consider the academic whose writing consists primarily of letters, exams, and other routine documents. Less frequently, this person may also write papers or books that require footnotes, tables of contents, and indexes. Looking at these problems separately might lead to buying two word processors, each highly tuned for the specific application.

Unless a user really needs two programs that work differently, however, a better choice is one product that can perform both tasks adequately. This solution

cannot be seen by looking at each problem out of context. Another example has to do with mass storage. Most lighter uses of a computer can fare well in a diskette environment. Users who delude themselves into believing that their big data management problem will fit onto floppies may pay a lower price for the system to begin with, but only at the cost of time and later additional expense.

Other Computers

When I finally get around to suggesting a computer, I don't always recommend IBM PCs.

Last year, quite a few of my friends asked me what computer to buy for Christmas. In almost every case, they had already bought a Commodore 64 and were trying to find out what I thought. I happen to like the machine a lot. In fact, for those people who are just exploring or trying to educate themselves, I recommend it every time. My theory is that the machine is so cheap that it can be thrown away or sold to the kid down the street for half price when an upgrade is desired or the owner decides that owning a computer is a mistake. There is surely enough software for the machine to satisfy the casual user.

For more serious buyers looking for a well-rounded family system, I have usually recommended Apple. The library of software available for the Apple II is so vast that it is very hard to make a mistake with this recommendation. One of Apple's limitations is the storage capacity of diskettes, but third-party alternatives abound. Apple's pricing has grown more aggressive and will continue to be so.

Then, of course, there is the buyer for whom nothing "less" than a PC will do. (This difference in image between IBM and everyone else, especially Apple, is amazing.) In these cases I go with the flow; my primary concern here is that the person end up with the proper configuration and software.

Want my advice? Buy nothing, or else buy a Commodore, or an Apple, or a PC, or . . .

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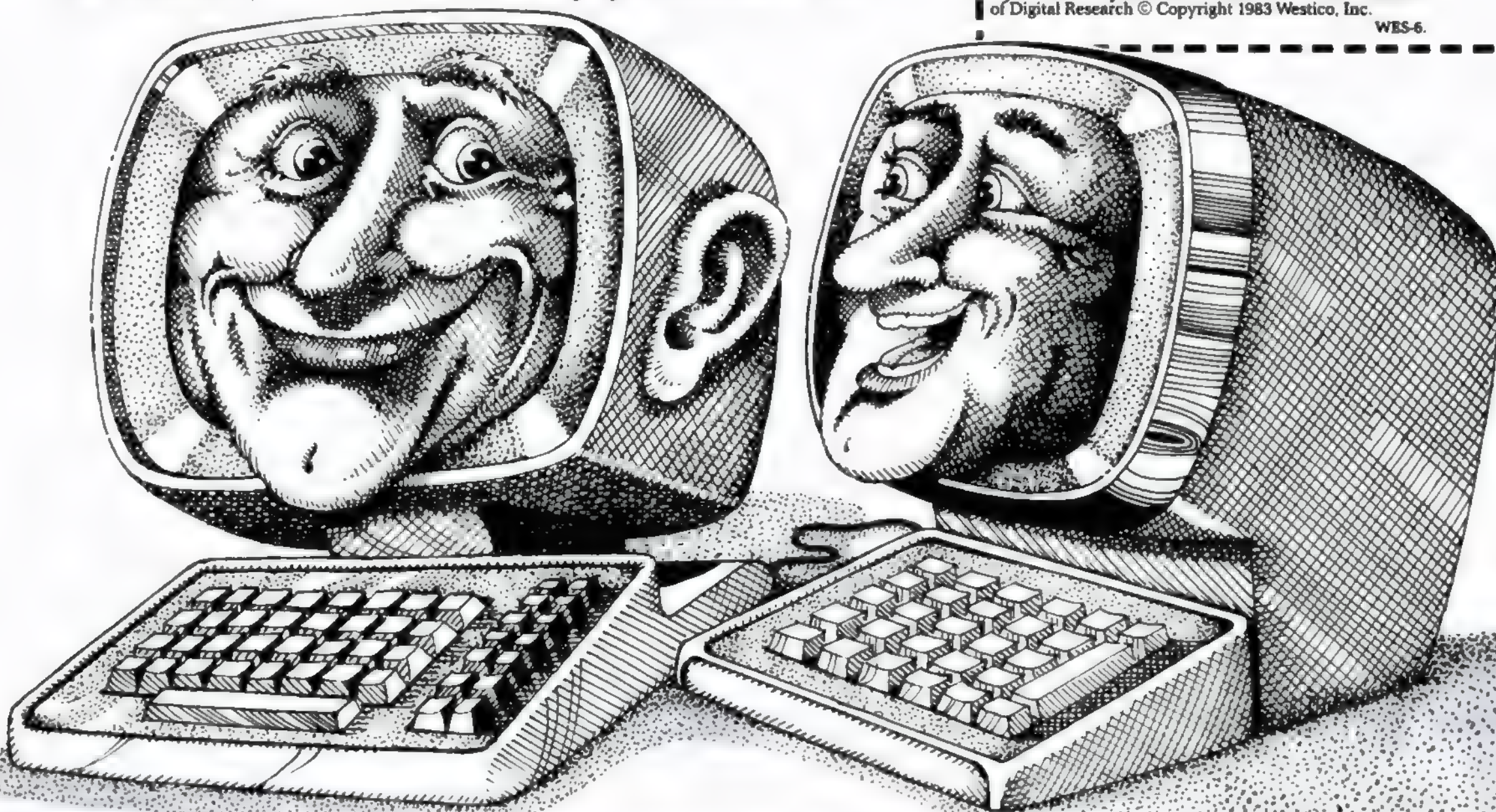
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CIRCLE 194 ON READER SERVICE CARD

Cosmic Indigestion

This issue's arcade offerings bring you great graphics and good fun at the end of the world, plus a chance to live out your murderous movie-monster fantasies without hurting anyone.

So you've been having apocalyptic nightmares about the end of the world. Well, dream no more. With *Cosmic Nightmare* you now can see your fears visualized on your PC monitor.

This is the game situation: It is some time far in the future and you're stranded in an energy sphere on Earth's only atomic-powered asteroid as phantoms of the universe prepare to take over the planet. Demons of sundry shapes and sizes want to recharge themselves from the asteroid's atomic power station. Your assignment is to repel them as best you can with your energy sphere and to keep them away from the power plant for as long as possible. Unfortunately, the phantoms are indestructible. At best, you can attempt to jolt them with your energy sphere, which will send them temporarily back into space and give the planet Earth a short-term reprieve. This is how you win points in *Cosmic Nightmare*.

Cosmic Nightmare

Wood & Clay Hi-Tech Gameware
3134 Orange St.
San Jose, CA 95127
(408) 258-5279

List Price: \$32.50

Requires: 64K RAM, color/graphics adapter, color or monochrome monitor, joysticks optional.

CIRCLE 797 ON READER SERVICE CARD

Planetary destruction is inevitable. You fight the good fight, but eventually you run out of energy. Then you watch helplessly as Earth turns upside down and melts away in bright colors and stunning graphics, to the sound of "Taps."

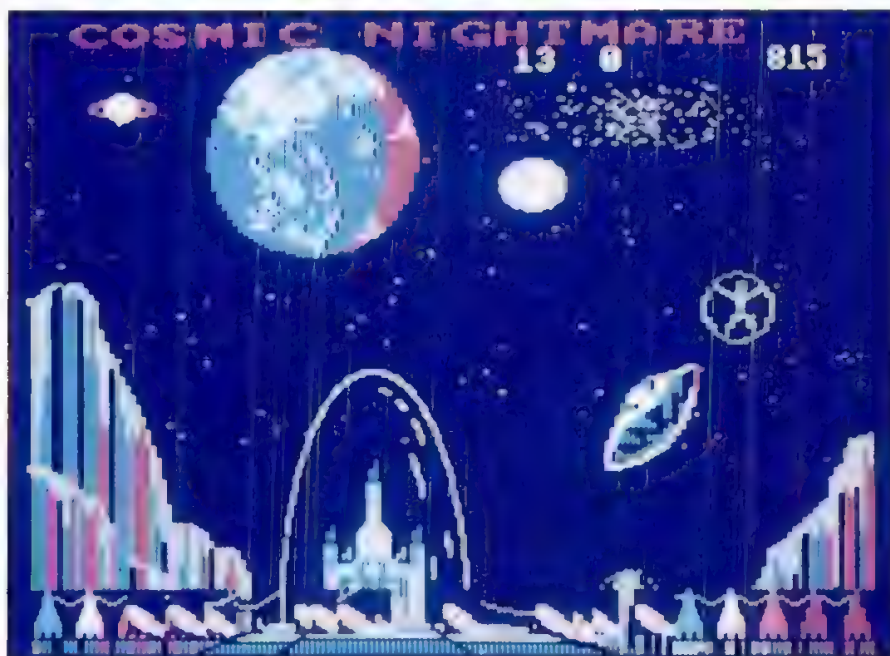
Playing the Game

After booting up with DOS, you're given a menu listing a series of choices to set the parameters for each game. You can play from the PC keyboard using the cur-

sor control keys, or with joysticks. You can play alone or against a rival.

The function keys are used to fire, control the sound, pause, rerun the game with the same options, change the options, and abort the game. The F6 key, labeled the "mystery switch," transforms the asteroid and distant Earth into objects that look like Lego block structures. It can also split the screen into six mini-screens. The A to Z keys change the colors of the screen.

Point values are based on the size of the



This screen from *Cosmic Nightmare* shows the world still in one piece.

ANNOUNCING



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- **Software Review:** What packages are right for you PC WEEK compares and analyzes important releases . . . tells you how to use them effectively.
- **Hardware Survey:** A business-oriented buyer's guide and a product directory detail the features of product classification and give you the technical and financial considerations involved.
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- ☐ No

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(Please report accurately for each model indicated)

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IBM XT/370					
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IBM PCjr					
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| <input type="checkbox"/> C. Distributor | <input type="checkbox"/> Z. Other (please specify) |
| <input type="checkbox"/> D. Retail computer store | |

9. Please indicate below the communications capability for which these Personal (Micro) Computers are used.

- ☐ A. Communicate with remote timesharing or database
- ☐ B. Communicate with internal mainframe or minicomputer.
- ☐ C. Used in local area network
- ☐ D. Download data from mainframe or remote service.
- ☐ E. None of the above

9a. Please indicate below the applications for which these Personal (Micro) Computers are used.

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| <input type="checkbox"/> 1. Accounting | <input type="checkbox"/> 9. Graphics Design |
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| <input type="checkbox"/> 8. Financial Planning | |

10. Do you help acquire, recommend, specify or approve any of the products or services below?

- ☐ Yes (If yes, please check all that apply)

☐ No.

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- ☐ 2. Minicomputer
- ☐ 3. Personal (Micro)

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- ☐ 8. Graphics Printer
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- ☐ 16. Memory Board
- ☐ 17. Communications Port
- ☐ 18. Plotters/Charting Devices
- ☐ 19. Local Area Networks

Software Packages

- ☐ 21. Communications
- ☐ 22. Accounting
- ☐ 23. Order Entry/Inventory

24. Payroll

- ☐ 25. Time Billing
- ☐ 26. Financial Planners/Spreadsheet

27. Project Managers

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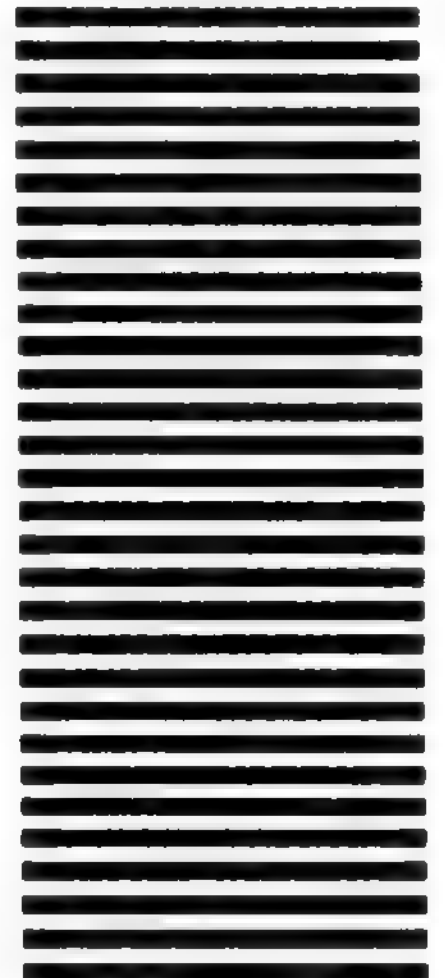
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demons you manage to repel. The smallest ghosts are worth the most. It's harder to zap double demons, but they're worth twice as many points and, at certain times in the game, extra energy as well.

As the game progresses, the power in your energy sphere gradually dwindles. Each time you fire, you deplete your energy resources even further. Your score and current energy level are displayed in the upper right-hand corner of the screen. A running count of how many invaders have pierced your defenses is also displayed. At the end of the game, the top 10 scores are listed with the players' initials, ranked by demon speed. If you break into these exalted ranks, the game sounds a triumphant reveille.

You may ask yourself, what's the sense of playing this game if the world is doomed anyway? The challenge is in chalking up as many points as possible, in beating your own previous scores and the scores of your friends, and in testing your own reflexes and strategy against increasingly devilish demons. The destruction of the Earth may seem like a grim and depressing subject matter, but that doesn't detract from *Cosmic Nightmare's* unusually vivid graphics. The view of the earth, floating in space with the Western Hemisphere visible, is astonishing.

On our *PC Magazine* scale, with one at the bottom and six at the top, *Cosmic Nightmare* rates:

FUN:	4.5
CHALLENGE:	4.0
GRAPHICS/SOUND:	5.5
TOTAL:	14.0

Crush, Crumble, and Chomp!

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Do you remember the old song, "The Eggplant That Ate Chicago?" It's not just a sci-fi fantasy anymore, at least not if you play *Crush, Crumble, and Chomp!* This game features a sea monster that eats New York and a Glob that dines on Tokyo.

In what's called "the movie monster game," the ogre of your choice is unleashed on Tokyo, Washington, D.C., New York City, or San Francisco. You control the monster and do your best to make it eat people—"human units," as they're officially dubbed—and demolish buildings and bridges.

You can choose to become the dinosaurlike Goshilla with its insatiable appetite, the amorphous Glob that leaves a trail of flaming ooze behind it, the spiderlike Arachnis, the mechanical Mechismo that looks like a refugee from the set of *Return of the Jedi*, Kraken the sea serpent, or Mantra the flying horror.

Each creature has a specific combination of powers, abilities, and Achilles' heels. Some can fly, swim, or burrow underground, while others are restricted to surface travel. All but Mechismo, which is automated and doesn't get hungry, can grab and eat humans.

Breathing fire, atomizing buildings, or zapping flying units with a ray beam are all in a game's work for some monsters. And some have unique talents: Arachnis can weave a web to block bridges and roadways, Goshilla lashes its tail around to attack opponents at its flank, Mantra has a deadly ultrasonic scream, and Kraken's tentacles can rip apart both bodies and buildings.

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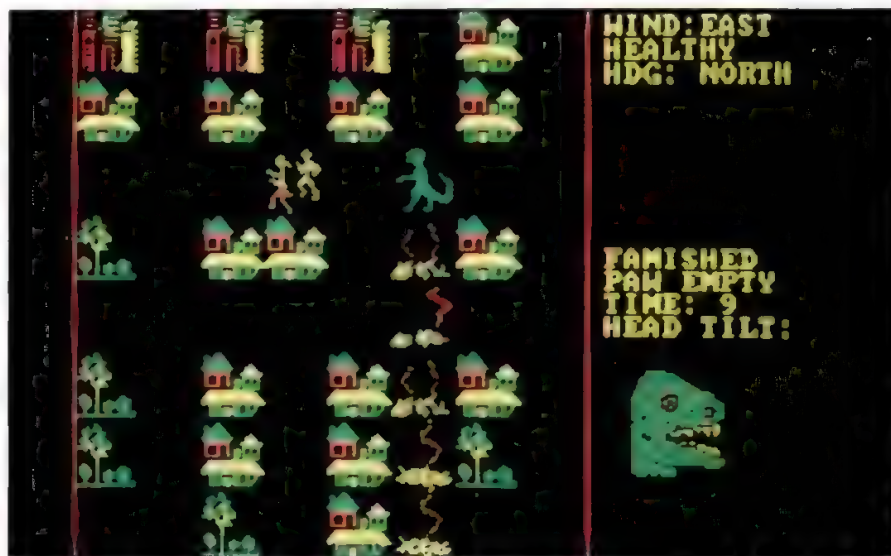
PC ARCADE

bird?" the game asked me. I doubt you've ever seen a flying brontosaurus, but mine purchased the power of flight for 35 credits. Other choices included subsurface travel ability, skin thickness, and the power to regenerate body damage.

Crush, Crumble, and Chomp! is played from the keyboard. You set the speed, select a ready-made monster or make your own, and choose a target city. Even the monster's objectives are variable: You can opt for an emphasis on physical destruction, killing all humans, slaying combat units, or mere survival. You can also decide on a program in which almost anything your monster does earns points.

Each target city is composed of 16 sections of 64 squares each. Your monster occupies one square at a time; other squares may be empty or may contain features such as buildings, tanks, or people.

The perspective is a combination of a ground-level view of each square and a downward view of the section as a whole. Only one section at a time appears on the



This *Crush, Crumble, and Chomp!* screen reveals a trail of destruction.



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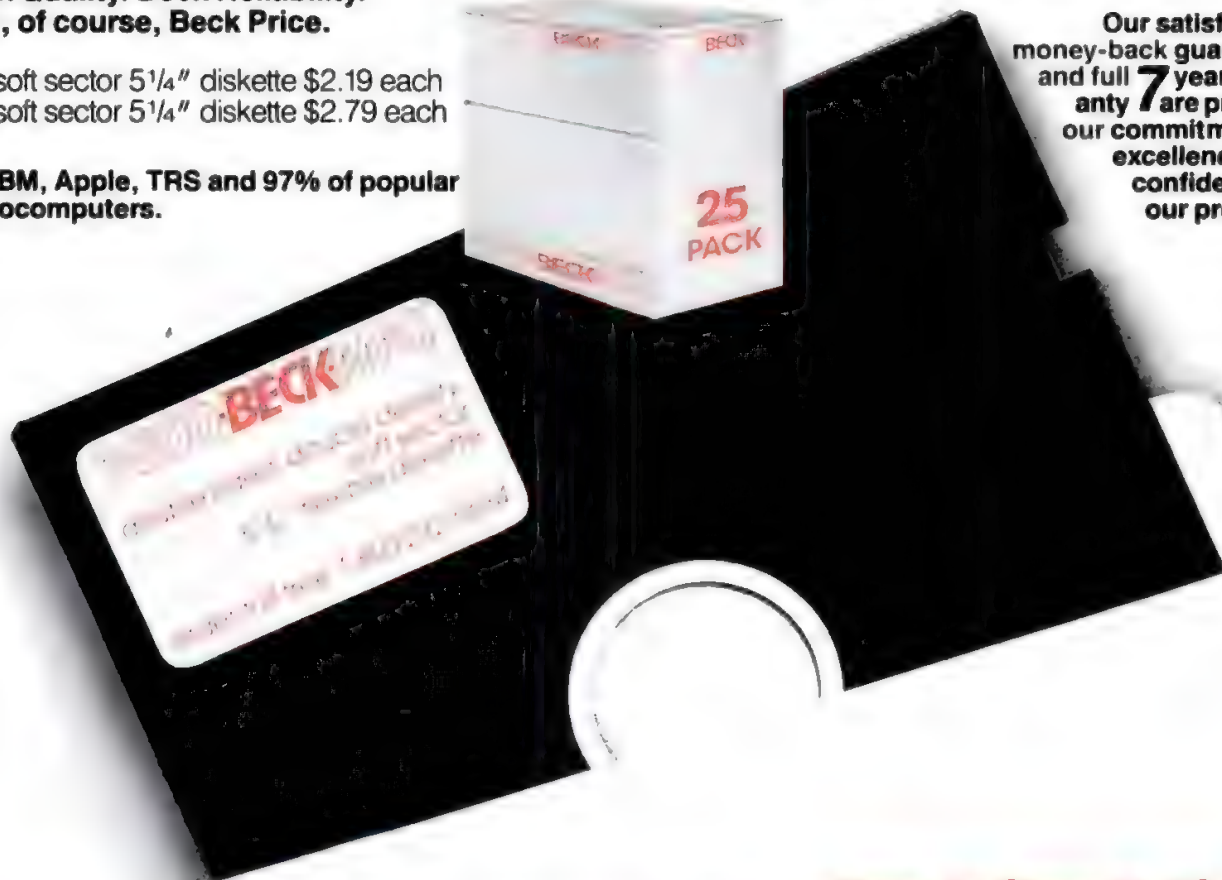
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screen, but your monster travels easily from one section to another. Movement is subject to each creature's physical limitations. For example, some can't cross water except over a bridge, while others can swim or fly.

Status reports are automatically provided on the right side of the screen. They include wind direction, the direction your monster is heading, its physical condition (scaled between healthy and critical) and hunger level. A question mark on the bottom of the right side of the screen is the prompt for your turn to move, while the program itself controls the movement and actions of the humans.

Defeat can take three forms. There's sudden death if the monster mistakenly attacks a power plant, fuel depot, or ammunition storehouse. Slow death results from injuries and hunger. Finally, beware the paralyzing and fatal attack of the Mad Scientist.

Although variety may be the spice of computer games, the quirks and peculiarities of the different monsters make it difficult to get accustomed to *Crush*, *Crumble*, and *Chomp*! I had trouble manipulating the monsters and keeping track of the direction in which they were moving. Maybe I should have taken to heart a bit of advice in the manual: "If a monster can manage to learn to turn its head in the proper direction, so can you." I gradually got better at it, but it took longer than I would have liked. That probably will be your experience too, if you don't give up in frustration when your monster is backed up against a river, you don't know how to make it fly or swim, and it's besieged by a horde of tanks and helicopters. The learning process would be more pleasant if the clever and witty manual had been stronger on simple explanations and instructions.

In our ratings, this is how *Crush*, *Crumble*, and *Chomp*! fares:

FUN:	3.5
CHALLENGE:	4.0
GRAPHICS/SOUND:	4.0
TOTAL:	11.5

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A Step Beyond the PC

Two new books, one on careers in computing and the other on accessing on-line databases, can help expand the horizons of personal computer users and show them the big picture.

Personal computers have introduced millions of people to the world of computers, but many of these converts are afraid to leave the comforts of their PCs to venture into other equally rewarding areas of computing. *PC Magazine's* two executive editors have both written books designed to help individuals see the bigger picture and make the transition from personal computing to the field of computers as a whole.

Connie Winkler's *The Computer Careers Handbook* offers a detailed look at current and future opportunities in the data processing industry. It's designed to help people who can't make heads or tails out of the computer classifieds but still feel that the computer age holds the potential for a fulfilling career.

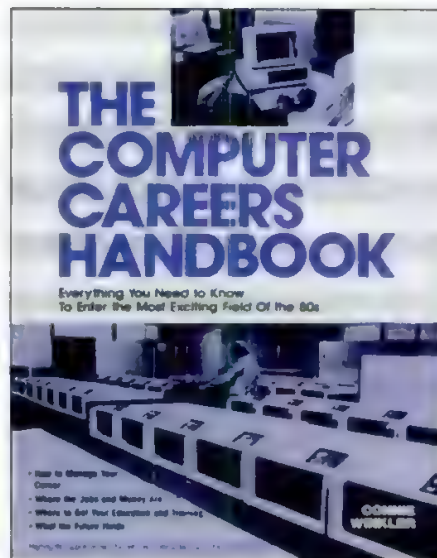
Mike Edelhart's *Omni Online Database Directory*, coauthored by Owen Davies, provides a comprehensive and engrossing guide to over 1,000 databases. Armed with the book's well-researched database descriptions, a modem, and an "I don't care" attitude about your phone bill, you can transform yourself into a global information gatherer without ever leaving your PC.

The two books are very different, but both recognize the human aspects of the development of the computer industry. The industry is rapidly shifting from the domination of large, expensive, and

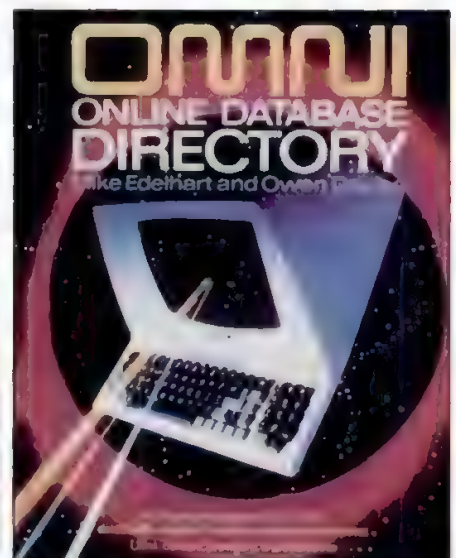
exclusive mainframe machines into the reign of smaller, less expensive, personal computers that allow individuals to wield an enormous amount of computing power. The PC can be a steppingstone to a more general computer literacy; Winkler's guide to the job market and Edelhart's introduction to databases can help you make the leap.

There are at least as many names for

data processing professionals as there are Eskimo words for snow: project managers, training specialists, database administrators, and applications programmers to name a few. Just knowing about computers is no longer enough. I've worked as a technical writer for large data processing concerns for a long time and I'm still stymied by half the job titles I run into. Large data shops are complex monstrosities



The Computer Careers Handbook
Connie Winkler
(Arco Publishing; New York, 1983)
142 pages; softcover; \$7.95
ISBN: 0-668-05530-8



Omni Online Database Directory
Mike Edelhart and Owen Davies
(Collier Books; New York, 1983)
292 pages; softcover; \$10.95
ISBN: 0-02-079910-1

BOOK REVIEW

when it comes to organizational structure. Even the people who hold the jobs often don't fully understand the responsibilities that go with their particular titles. The key

is to remember that where there's data to be processed, there are jobs to be had, but not until you understand something about the way large companies organize their

data processing operations.

Winkler's book is an ambitious attempt to conjure up a picture of the current state data processing and computer environments. Before you decide if "big-time computing" is for you and which tentacle of the data processing octopus you think you'd like to wrestle with, you should take a look at this book.

The Computer Careers Handbook contains a potpourri of career-related materials. It provides an overview of the different tracks the computer job market offers, their salaries, and the type of experience they require. For those of us less attuned to the fine details of the information age, Winkler's differentiations between the data processing industry and the computer industry are helpful. Her "crystal ball" insights give readers a sense of the prospects for growth of particular career paths. In her chapter titled, "Where the Jobs Will Be," Winkler displays a fair grasp of the market's problems and possibilities. In chapters on women, minorities, and the handicapped, she offers well-organized, statistically documented, common-sense approaches to getting a foot in the data processing door.

One problem with a book like *The Computer Careers Handbook* is timeliness. Computer careers are evolving as fast as the industry itself. The geography, economics, educational strategies, and supply and demand demographics Winkler presents are rapidly changing from current events to history. Many of the data processing areas of industry are already becoming saturated with employees.

I would also have liked to have seen the author place more emphasis on newly evolving, less traditional career entry points. There are excellent computer-related jobs that don't rely on programming or engineering ability. Jobs in computer sales, computer training, technical writing, computer communications, customer service, management consulting, and office automation consulting, for example, require bright, well-rounded individuals but not an inordinate amount



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BOOK REVIEW

of technical expertise. They demand people who can work with other people—computers are secondary. These computer-related jobs are ideal entry vehicles for people switching careers or entering computing from a nontechnical background. They're new, they're exciting, and there are no rigid job titles to lock you into narrow career paths.

Despite its shortcomings, this is an important book. It forces those of us who have come to know and love the world of the PC to remember that the industry also requires a certain mainframe savvy. For people who are toying with the idea of embarking on a lucrative computer career, it helps diagram a means to the end. *The Computer Careers Handbook* provides a real service as a good, no-nonsense demystification of the computer job market.

* * *

Excerpt: *For both women and minority group members, the data processing profession is a good one. This is partly a matter of sheer practicality. The profession is so new and changing, and so short-handed, that many doors are still open to newcomers.*

One study showed that women in computer programming earn 91 cents for every dollar men earn. While this is not perfect, it's remarkably better than the situation of women in the work-force overall, who earn only 59 cents for every dollar a man does.

* * *

Omni Online Database Directory

The database revolution is here. As personal computers are becoming more familiar and as people are finding they need more and more access to timely information, the number of on-line databases is exploding. Edelhart and Davies inform us that in 1975 there were about 300 on-line databases in the United States—most of them highly specialized, technical, and expensive. In 1983, there were 1,500. And as the industry becomes less specialized and more affordable, so

does the world of on-line information.

If you're searching for the latest word on mathematical modeling, trying to find the best Indo-Pakistani restaurant in the Big Apple, itching to know the price of gold in Zurich, or simply looking for some public domain software to download—get hold of a computer, a modem, some inexpensive special software, a copy of *Omni Online Database Directory*, and you're on! The world is at your modem's beck and phone call.

No matter who you are and what you use your computer for, on-line databases can probably be of use to you. They let you use your computer to hook into the resources of large computer systems containing vast repositories of knowledge. Without trudging from library to library or turning page after page, you can access information on just about any subject imaginable.

The *Omni Online Database Directory* lets us enter the age of electronic communication in the safety and comfort of the traditional book format. If you're interested in the on-line world, you'll be interested in this book. It's an excellent companion for those who have already used on-line systems and it's bound to help on-line novices, too. The book immediately lessens the anxiety of making that first on-line query. Edelhart and Davies answer all the right questions: What types of databases are there? What sort of equipment will I need? How much will it cost? How do I go about making contact with a particular on-line vendor? How can I maximize the benefits of my on-line search time? The book covers all the bases.

Buying this book can even save you money. On-line searches can be expensive. The best way to trim the costs of using telecommunications lines is to have a pretty good idea of what sort of queries you want to make before you access the database. Whether you're a business person, a researcher, or just an interested on-line aficionado, the book's succinct description of each database's offerings tells you what to expect and what ques-

tions to ask before you pick up the phone.

On-line databases differ in many ways: Some respond to simple English, others require more program-oriented queries; some are quite specialized, while some are general-purpose. Edelhart and Davies break-up their database directory into 50 subject areas. They include sections on entertainment, agriculture, jobs and employment, science and technology, chemistry, and city planning. I didn't find any glaring omissions.

Each entry has obviously been carefully researched and substantiated. Each one details the content of the database and relates important user's comments such as to whom the database is geared to and how it compares with similar services. Each entry indicates who supplies the database's information and who acts as the on-line vendor.

Some of the entries mention the annual subscription fee; most do not. I do wish the book paid more attention to the dollars and cents involved in accessing various databases. Long-distance comparison shopping can get expensive.

Omni Online Database Directory is a treasure for anyone interested in conducting on-line research. Perhaps the book will soon become an on-line database itself. In order to stay relevant, a book such as this needs constant revisions and updates and would thus lend itself to computerization.

Technically, *Omni Online Database Directory* is nearly impeccable. On a more philosophical level, though, I find it necessary to defend the concept of books in general. While the authors extol the pleasures of the database, they neglect the pleasures of the book. In this book's introduction, reference books are relegated to the status of archaic relics. While on-line experiences can be rewarding, there's no substitute for mulling over a printed page. And cheapskate that I am, on-line searches make me financially nervous. Scholarly research in some musty corner of the library is a special kind of meditation that I never want to do without. ■



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Automating an Index

Indexing is one of the most tedious tasks a technical writer faces. There are programs that can help with sorting and alphabetizing, but they don't go far enough.

As a technical writer, I view personal computers and word processors as tools that help me do my job more efficiently. They reduce the drudgery inherent to my profession. One of the greatest sources of this drudgery is creating an index.

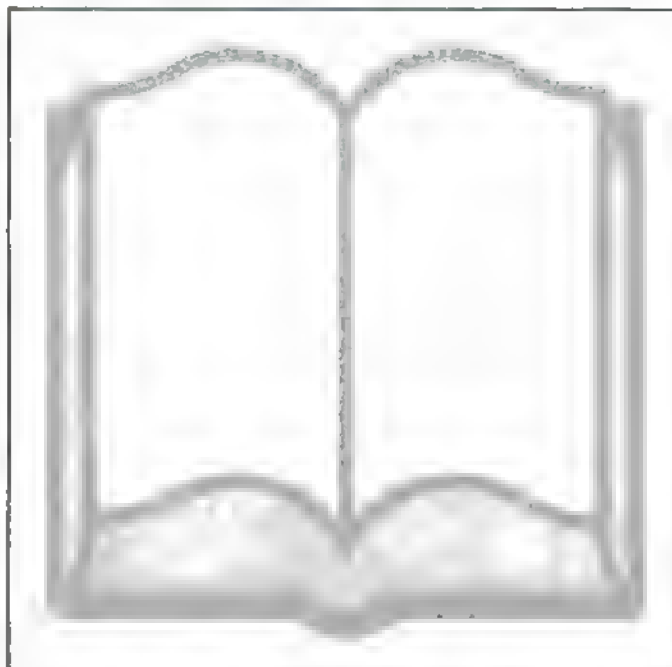
As recently as 10 years ago, few technical writers generated text on computers. There were no computerized tools to help create an index. You had to agonize over the task by hand.

To index a 500-page manual, for example, you probably grabbed a few stacks of 3-by-5 cards and started going through the book page by page. When you found a subject you wanted to include in the index, you wrote down the index entry and the page number on a fresh note card. You continued this process, one entry per note card, until you finished paging through the entire manual.

The next and most tedious stage was alphabetizing and sorting. First, you took the stacks of index cards and arranged them in alphabetical order. Then you merged the entries with the same names but different page numbers and, if necessary, created subentries.

After you completed these steps, which usually took the better part of a week, you still had to type up the final index and proofread it against the stack of cards.

Suffice to say that the indexes produced



by this method were not as good as they could have been; they were often incomplete, inaccurate, and contained an insufficient number of cross-references.

The state of the technical publications industry has advanced considerably since precomputer days. Today, no publications group can truly call itself professional unless it uses sophisticated word processing equipment. Indexing, while still a cumbersome task, has been automated enough to make old-timers drool with envy.

The Dedicated Advantage?

When many publications departments first automated their operations, they used expensive, dedicated word processing equipment. Now, however, they are abandoning these machines in favor of reason-

ably priced, multifaceted PCs. In addition to word processing tasks, PCs can be used for scheduling and budgeting. Furthermore, they are inexpensive enough that each writer can have his own computer.

In spite of these advantages, the switch from dedicated word processors to PCs presents a problem. Unlike the dedicated word processing systems, most word processing programs for the PC do not provide indexing features. So how do you create an index without resorting to the manual method?

One way is to select a word processing program that *does* have an index-generation feature. *The FinalWord*, from Mark of the Unicorn (in Cambridge, Massachusetts) and *Peachtext*, from Peachtree Software (in Atlanta, Georgia) are two such products. *Wordix*, a text formatter from Emerging Technology (in Boulder, Colorado) is also capable of producing an index, although you have to write the macros to do so. Finally, MicroPro, in San Rafael, California, offers *StarIndex*, a program that works with *WordStar* to create indexes.

Except for *StarIndex*, these products are similar. To create an index, you include a special formatting command in your text. For example, when using *The FinalWord*, you would include the following line near the place you want to refer your readers:

HOUSE PC WAREHOUSE PC WAREHOUSE PC WARE

WRITING

as underlining or boldfacing text.

Since I don't have *WordStar*, I haven't had the opportunity to test *StarIndex*. Although it appears to be an ideal indexing program, it has one problem: Your index entries must consist only of text that appears in your document, which makes cross-referencing difficult, if not impossible.

If none of these indexing programs seem right for your situation, how do you generate indexes? You certainly don't want to leave your powerful PC sitting in a corner while you scribble your index on note cards.

One thing you can do is use the principles of the note-card approach and allow your computer to do some (but not all) of the tedious work. First, print out a copy of your final document. Then, go through your text and look for index entries. But instead of recording the entries and page numbers on note cards, record the entries in a file on your PC.

If your word processor supports multiple windows, you could bring up your document in one window and an index file in another. You could then scroll through your document and record your index entries at the same time. However, if you use a program like Microsoft's *Word*, this method won't work. *Word* won't show page numbers on the screen, so you can't record them without a hard copy.

Once you finish, you will have a file of index entries listed in page order. You will want to alphabetize this file for your final index. However, be sure to save this first index file. If you change your document later and need to alter your index accordingly, it's much easier to go through an index ordered by page. You simply start at one end of the document and work your way through to the end, without having to flip back and forth constantly.

To sort your index, you can use the DOS 2.0 SORT filter. It merely places entries beginning with uppercase characters ahead of those beginning with lowercase characters, but it's better than no sorting program at all.

Generating an index on your PC is a time-consuming task that is not yet entirely automated. In some ways it still resembles the note-card method. The manufac-

turers of word processing programs have a big job ahead of them: Old-timers like me are still waiting for a better way to create indexes. ■



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Creating Quality Courseware

Authoring systems can help make it easier for nonprogrammers to create their own educational software, but writing good programs will always require careful analysis and planning.

At one time or another, we've all been seized by some luminous insight that whispers seductively, "Take me. I'm original—and I might make you rich." Today's educational software marketplace offers ample opportunity to translate this kind of inspiration into a product, and possibly into a profit.

A previous column, "Acronyms for Education" (see *PC*, Volume 3 Number 7), described courseware (educational software) and what it can do. Here I'll look at how it is created, and at its five-step dance from a bright idea to a reality.

Phase One: Analysis

Courseware development begins with information gathering. The goal is to identify a human performance problem, study it, and propose an educational solution. The central question is, "Can this problem be solved through training or education?"

If the answer is no, then instructional technology has little to offer. If the answer is yes, analysis can continue, and three things must be done:

- The audience of learners has to be defined: Who are they? What do they know already? How do they learn?
- Educational objectives need to be specified: What should learners be able to do after instruction? How well should they be able to do it?



- Requirements affecting courseware development must be spelled out: What's the budget, the timeline, and the location of the training sites?

Phase Two: Design

Next, a design document is prepared to describe how the courseware meets the specified objectives. The significant questions this document must address are:

- What instructional strategies will be used? Computer assisted instruction (CAI) options include tutorials, drill and practice, and gaming and simulation.
- What additional materials and media will be needed, and at what point and in what proportions? CAI may be the wrong approach to some educational objectives. The appropriate medium should be determined in the design phase.

- What rules will limit the learners' interaction with the courseware? Standardized tests such as the Scholastic Aptitude Test often include messages like "STOP. You May Review Your Work But Do Not Turn the Page Until Told To Do So." In similar ways, courseware sometimes restricts what learners may do. Examples include setting task completion times, mastery criteria, presentation sequence, and review capabilities.

Phase Three: Development

The development phase creates the link between the courseware and the user. Display and logic specifications describe general frame formats, positioning, help messages, interframe movement standards, consequences of all keystrokes, and contingency rules for displaying error messages.

There is no dialogue yet; that is supplied by a subject-matter expert. During development, this expert's knowledge of the educational content is transformed into text, often in collaboration with a technical writer, and mapped to the screen.

Phase Four: Programming

Now the programmer renders the ideas and interactions that spring from the development phase into code. The results should not be a surprise. What appears on the screen should match the objectives of

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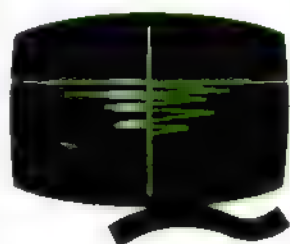
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EDUCATION

the design document and the display and logic specifications.

The courseware should not be buried under mountains of programming pyrotechnics. There's no need to bludgeon the audience with over-elaborate graphics and snappy musical riffs piped in through tiny speakers.

Phase Five: Evaluation

Neither smiles nor sales is a true measure of courseware success. Assessing instructional value means asking the right questions and properly collecting the answers. The educational objectives listed in the design document should contain measurable evaluation criteria. If these are not sufficient, appropriate performance measures must be devised at the evaluation stage. The evaluation should answer two questions. The first is, "Does it work?" Dysfunctional courseware is the legacy of careless design and programming.

The second question is, "Does it work as intended?" The answer to this question is discovered through formative and summative evaluation. Formative evaluation is performed throughout the development process; summative evaluation occurs when development is complete.

The purpose of both evaluations is not so much judgment as feedback. Problems identified during formative evaluation are corrected before being applied to the final product. Summative evaluation reveals residual problems plus practical information such as reasonable completion times and normative performance data.

Authoring

This five-step development process is not unique to courseware. But for courseware, the development and programming phases of the process are now being subsumed into authoring systems. The other three phases of the cycle remain important, however. Authoring systems are not a substitute for careful analysis, design, and evaluation, but they can greatly simplify development and programming.

Authoring systems employ several tools. These can include utilities such as graphics and tutorials, but the primary tool is the author language, a programming language optimized for courseware development. Examples of author languages include Pilot, Coursewriter (part of IBM's III system), Tutor (part of Plato), Encore, and the Wicat System's Wyse.

Courseware can be, and often is, written in a conventional programming language. But high-level languages such as BASIC and FORTRAN have limited abilities to interpret user input. Author languages, on the other hand, have repertoires of response-processing commands that allow them to handle user input with flexibility and grace. This response-processing power compensates for the imbalance between the profound world knowledge of the learner and the circumscribed world view of the computer. For example, response-processing commands allow a program to scan a sentence for key words only, ignoring capital letters and minor misspellings.

Authoring systems can be a cost-effective solution for individuals and groups interested in computer-based training but intimidated by high development costs. One reason is their promise of the ability to create courseware without the services of a programmer. Authoring advocates point out that authoring systems are so rich in supporting tools that individuals with no programming experience can produce courseware with little training. This often translates into reduced development costs.

Clearly, authoring is a potent concept and a powerful tool. But before you jump into it, consider that courseware development is always costly. Authoring may reduce development costs but other expenses remain. These include the price of people, program delivery, administration, evaluation, and courseware maintenance.

Don't be afraid to look for hidden costs. Although the buy-in for an authoring system may seem low, other factors

EDUCATION

can drive up costs. You should know whether the authoring system permits courseware development for a variety of target machines or limits delivery to just one type of computer. You should ask whether that machine can be used for anything else besides courseware delivery. Check whether authoring requires a special hardware/software configuration or authoring station.

You should be aware that what you see may not be what you get. Authoring packages supply tools, not talent. Courseware created by a novice may look like just that. When examining an authoring system, observe samples of the courseware it can create. Check the development time and skill level required to produce each example. Mastering a handful of authoring commands may take minutes, but these may be sufficient to produce only the most trivial courseware.

Finally, you should remember that producing quality courseware does not depend on programming ability or an expert grasp of the subject matter. Sensitivity to the principles of design (consistency, clarity, and structure) and to educational issues (matching content to media and using sound instructional activities) is more important than any technical skill.

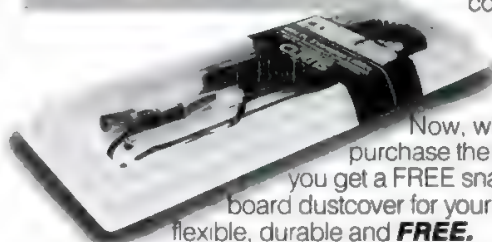
In courseware development, the critical choice is the selection of the computer as the educational tool. Computer-based training means many things, but it is not cheap and there are no insurance policies on courseware development projects. Protect your investment by taking a close look at the fit between what is to be taught and what the computer can do. Educational software can be very useful, but when it's misapplied, it causes frustration for developer and consumer alike. And the consumer is the final judge of any product. With this in mind, in a future column I'll discuss consumer evaluation. ■

Harold Golde is an internal consultant for the Organizational Analysis and Research Group at Merrill Lynch & Company.

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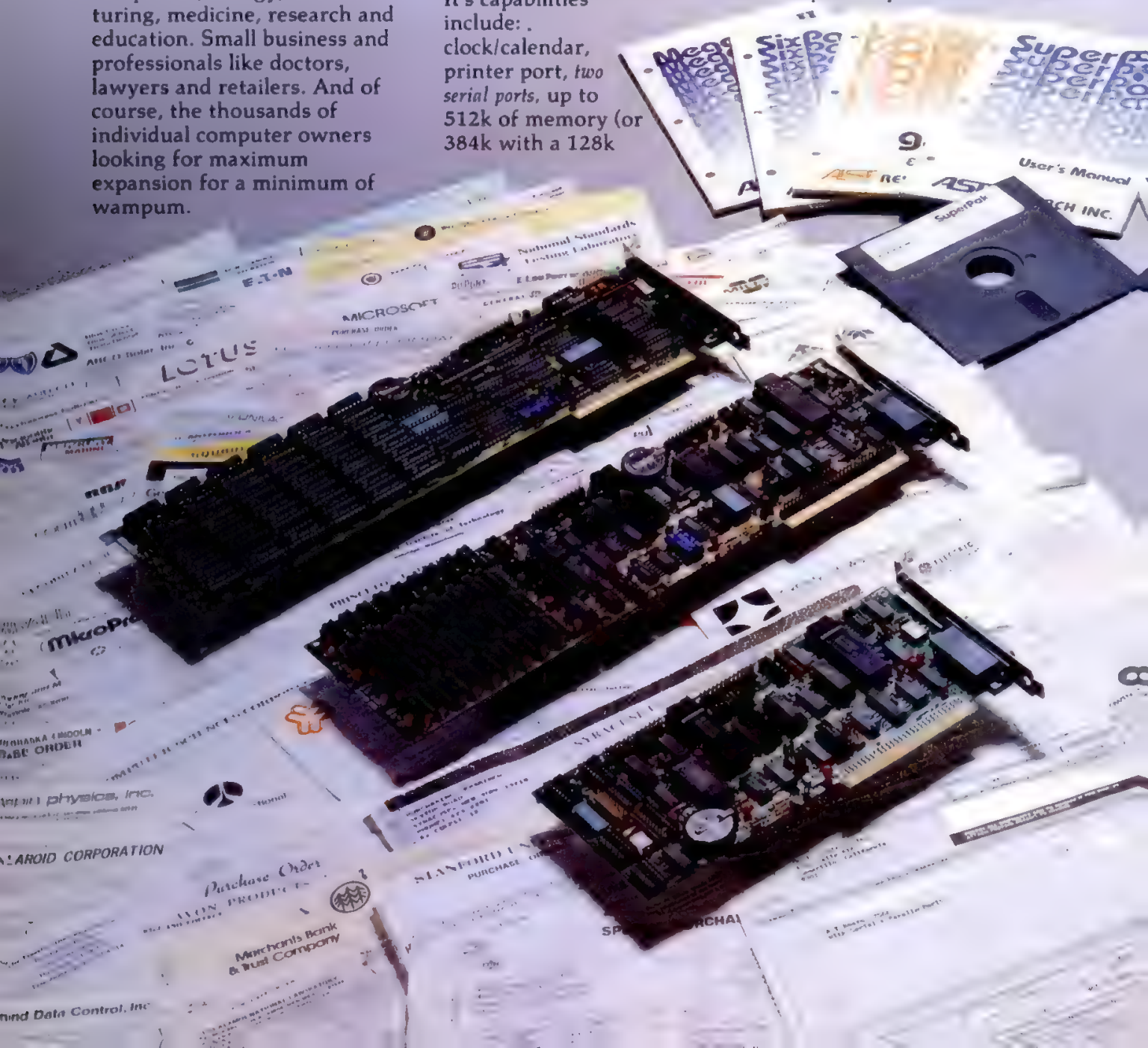
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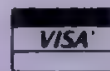
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Let's Get Technical

Stock market technical analysts will find Market Analyst very helpful in performing their complex calculations. This is the second column in a series on stock market software.

Stock market "technicians" gravitate naturally toward the microcomputer. This growing breed of investors and investment analysts prefer tracking of overall market trends to the traditional "fundamental" studies of stock-issuing companies themselves. Martin J. Pring, author of *Technical Analysis Defined* (New York: McGraw-Hill, Inc., 1980) writes that "technical" analysis is "... essentially a reflection of the idea that the stock market moves in trends which are determined by the changing attitudes of investors toward a variety of economic, monetary, political, and psychological forces. The art of technical analysis," he continues, "... is to identify changes in such trends at an early stage and ... to develop some characteristics that can help identify major market tops and bottoms."

If the technician is at all ambitious, following these many trends and predicting

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their influence on particular stocks entails collecting and processing enormous quantities of information. Most technicians spend a great deal of time on their analyses, and until the advent of microcomputers, could track only a few securities.

Now, with a PC, technicians can maintain historical price and volume data for hundreds of stocks, portray the information graphically, and then analyze it using their own formulas. Analysis tools vary greatly from technician to technician.

Technicians can also use the PC's communications ability to tap into database services such as the Dow Jones News/Retrieval Service or CompuServe for market information. And the computer's speedy processing of this data permits analysts to devote more time to decision-making than was previously possible.

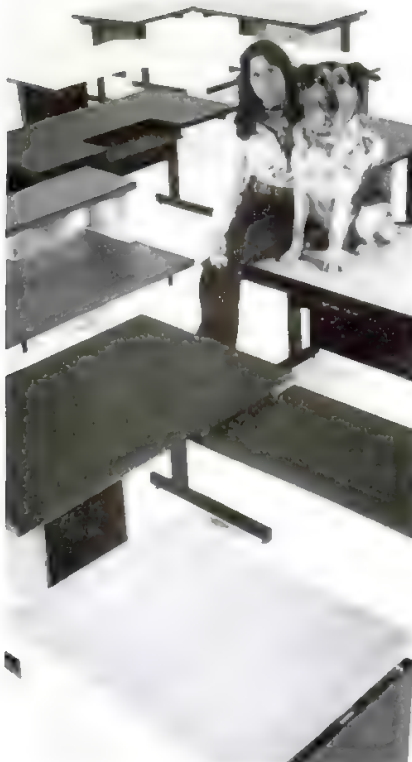
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The Market Analyst

Anidata's *Market Analyst* was introduced in July 1982 as a technical analysis package for the Apple II. Although not the first product of its kind, its completeness and processing speed made it significant. The package was written in UCSD Pascal and ran much faster than any similar program in its price range. Because of its UCSD operating system, it was also highly transportable; in March 1983, it became the first technical analysis system converted to the IBM PC. In April of the following year version 2.0 was released for the PC. This completely rewritten version includes a number of enhancements and new features. Anidata chose to rewrite the package in the increasingly popular C programming language and set it up to run under the more commonly used DOS 2.0 operating system. The entire system is menu-driven and requires only one keystroke to make each selection.

Market Analyst's main menu offers you four choices: (P)ortfolio Manager; (T)echnical Analyst; (N)ews, Views, and Quotes; and (R)econfigure System. You simply press the appropriate letter.

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on them. It will also maintain permanent records for tax analysis on securities you have sold. While it is certainly unsuitable for use as a stockbroker's portfolio system or even as a full-fledged investor's portfolio manager for an individual, the subsystem adds a nice touch to the package.

The News, Views, and Quotes subsystem is also a nice touch. It allows you to read and capture data from the Warner Computer Services and CompuServe database services, as well as from any other data service to which you may subscribe. However, you must use either Warner or CompuServe to obtain market price quotations. By arrangement with Anidata, Warner waives its registration fee for *Market Analyst* users. The system will store up to about 50 pages of information in an internal "buffer" that allows you to use the time-sharing service briefly and then review at your leisure the data collected.

You use the Reconfigure System option to tell *Market Analyst* such information as Warner's and CompuServe's telephone numbers, passwords, modem and printer types and conventions, and type of display. You use it only when you initially set up the system or in the event that you change the original parameters.

The Technical Analyst

The real heart of the *Market Analyst* is the Technical Analyst portion of the program (selection T on the main menu). This selection offers you the following options: (D)isplay and Analyze, (A)uto-analyze, and (F) Quote File Maintenance. The Quote File Maintenance option permits you to update historical price quotations for the securities you are following. You can do it either manually or automatically through the CompuServe or Warner services. You can also use this option to edit your files, update them to reflect stock splits, and print market data for the particular securities. The amount of data you can maintain for any security is limited only by the amount of disk storage you have.

The Display and Analyze option is the

charting and calculation portion of the program. It first presents you with a list of the securities on the disk you are using. When you select one from the list, its 140 most recent "data points" (about 6 months worth if you are collecting data daily) are loaded into memory and displayed in graphic format on the screen. Each data point shows the day's high and low price for that security as the extremities of a line; the closing price appears as a tick mark on the line. A second chart may also be shown on the lower half of the screen. A menu of analysis tools appears under the chart. The available analysis tools include:

Compression and Expansion of charts. Although the system will only display 140 data points for each security, it will work with as much data as you wish to use and have available. It will do so by reading additional data points in 140 unit "gulps" and combining them properly with the data already in use. For example, if you tell the system to compress once, the result will be 280 days (1 year) shown in 2-day points; if you told it to compress four times, the chart would show 2-1/2 years of weekly points.

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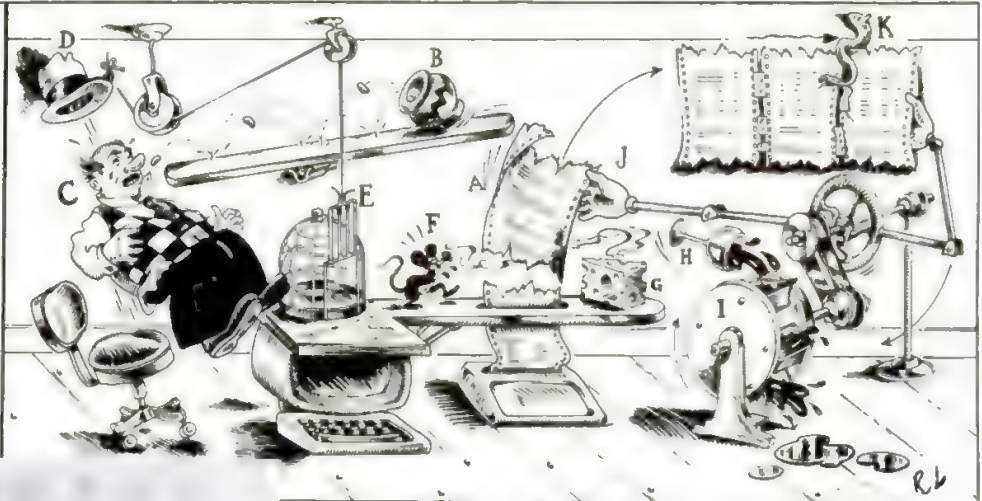
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RISING SPREADSHEET (A) KNOCKS MEXICAN JUMPING BEANS (B) INTO MOUTH OF NEUROTIC MAN (C) WHO IS SO DISCOMBOLATED THAT HIS HAIR STANDS ON END, DISLODGING HAT (D) WHICH OPENS CAGE (E) AND RELEASES EPICUREAN MOUSE (F).

MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED CAMEMBERT CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY AROMA OF OVER-RIPE GORGONZOLA (G).

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).



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grids. When doing multiple overplotting, the software automatically labels the studies. It allows data to be displayed in a semilog (exponential) format or as a point

and figure chart. You may display the actual market data numbers for any point on the chart as well as the numbers for the last study plotted. Finally, the package

will allow you to read text into a window on the screen for addition to the charts. This feature is normally used to add sales material or analytic prose to a printed chart.

Formulas. The package includes built-in functions for relative strength analysis, generation of relative strength indexes, linear regression and L. Williams's *stochastic* calculation. It also allows you to specify your own formulas (such as oscillators, volatility analysis, and comparative performance) and to apply them using only two keystrokes. You do not need to understand programming to specify your formulas. This simplicity is one of the package's strengths.

Auto-analyze

The final selection on the Technical Analyst menu, Auto-analyze, is a powerful tool that allows you to define any method of analysis you like, "train" the system to perform this analysis, and then analyze all the securities in your database using that series of calculations.

Once so instructed, the software will follow this algorithm for each security you are tracking. You don't need to wait around during this procedure. Some users, after fetching the needed market data, set

Auto-analyze is a powerful tool that allows you to define any method of analysis you like.

the system up to produce printed studies overnight.

In summary, *Market Analyst* is an excellent system for technical analysis; we recommend that you look into it. The program has many features and runs rapidly. Future columns will discuss other stock market software, including Anidata's own broker portfolio system, *Clientell*. Until next time, buy low and sell high! ■

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Avoiding Real Estate Alligators

Real Estate Tools I is a well-designed package of programs that helps you untangle the complexities of real estate investment and finance while steering you clear of bad deals.

The complexities of today's real estate transactions demand professional expertise. The bottom line is money, and the most frequently asked questions are: "What will the payments be?" "How much is it going to cost me?" "Am I going to make any money on this?" With over 300 types of mortgages or other loans currently available to the consumer, these questions aren't easy to answer. When you add to this the creative financing approaches introduced since the late 1970s, it's obvious that anyone buying, leasing, or selling real estate these days needs a great deal of help.

Real Tools

Ansonn Software comes to the rescue with *Real Estate Tools I*, a package of programs for the PC and its compatibles. This software, which was designed for real estate professionals or anyone else with an interest in real estate investment, can do amortization schedules and compute ev-



everything from balloon and wraparound mortgages to annuities and graduated payment mortgages.

The package, which was written in compiled BASIC by Ansonn president Bert Greynolds, impressively calculates net present value and the internal rate of return for real estate investments. It can handle as many as 100 variable cash flows or grouped cash flows. It works so well that the 200-page manual is barely needed. Nonetheless, for the novice, the manual serves as a well-written reference guide; it clearly explains many of real estate's financial mysteries. Greynolds has drawn on his experience writing a handbook for the popular Hewlett-Packard 12C handheld financial calculator for this manual, and his expertise is apparent. The manual walks you through each and every step, and

it contains none of the usual surprises.

While many real estate programs are burdened by too much detail, *Real Estate Tools I* is concise and quite easy to use. Its input method is similar to that of the popular financial calculators, so the analysis techniques will be familiar to many people. In addition, this package offers something most calculators can't—printouts for reports and audit trails.

Built-In Simplicity

Real Estate Tools I is completely menu driven; when you perform your calculations, all you need to do is respond to the questions on the screen. You simply type in your information and press the Enter key. The program guides you with clear instructions on the screen.

You select your option from the main menu and proceed to the application of your choice. While the printouts do not use fancy graphics, they are quite adequate, and you can put a heading at the top of each one.

Most people will probably use this program for calculating regular and balloon mortgages and for amortization schedules. It will also be used for figuring wrap-around and graduated payment mortgages, and cash flows.

Real Estate Tools I's thoroughness can be best illustrated by describing the method it uses to calculate balloon mortgages.

Real Estate Tools I

Ansonn Software, Inc.
2801 N. Surrey Dr.
Carrollton, TX 75006
(214) 446-4340

List Price: \$299

Requires: 128K RAM, two double-sided disk drives, printer optional.

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BUSINESS

You have the following options: solve for mortgage payment, solve for mortgage yield, solve for mortgage yield with points, solve for mortgage APR, solve for number of payments, solve for points, solve for price to pay, solve for remaining balance, and solve for monthly payment and balloon.

Figure 2 shows how *Real Estate Tools I* determines the monthly payments and balloon payment on a \$30,000 second mortgage, amortized for 10 years at 12.5 percent interest, with monthly payments to be made for 5 years. As soon as you enter that information, the monthly payment of \$439.13 and the balloon (or payoff amount) of \$19,518.49 are instantly displayed.

Although the program calculates instantaneously, moving back and forth between menus is a bit slow. The program

disks in the drives A and B work constantly; sometimes they grind their hearts out as they transfer in and out of program menus.

Buyers or sellers often change their minds about a transaction once they've seen the figures.

Real Estate Tools I's nicest built-in feature is the option to recalculate the operation you've just performed. This is an excellent feature because it reflects the realities of real estate ventures; buyers or

sellers often change their minds about a transaction once they've seen the final figures. *Real Estate Tools I* lets you retain all of your previous figures while you make only slight modifications, or enter completely new ones. Its flexibility makes it a joy to use and demonstrates how much care Greynolds put into his design for the program.

At times, however, the program will hang up. If you accidentally select the wrong option, you cannot escape from the option until the program has prompted you with all its questions. You must plug in some figures (any figures), and you can't retreat until the answer is displayed. This problem is not major, but it is a nuisance.

Alligators

Real estate financing can be a confus-

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BUSINESS

ing and sometimes dangerous maze. Investment opportunities that may appear promising at first could eventually lead to trouble. Unless you carefully compute

your options, you can quickly find yourself in financial quicksand.

In the real estate field, the term for property investments that end up continually requiring additional money to perform well is "alligators." If you don't constantly feed them, they snap at you until they swallow you whole—along with all of your money.

Real Estate Tools I has plenty of programs to deal with the alligators of real estate investment. Using the cash flow and payment schedule programs, you can easily determine where potential problems might lie.

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Figure 1: A Real Estate Tools I screen after calculating the monthly payments and amount of the balloon for a balloon mortgage.

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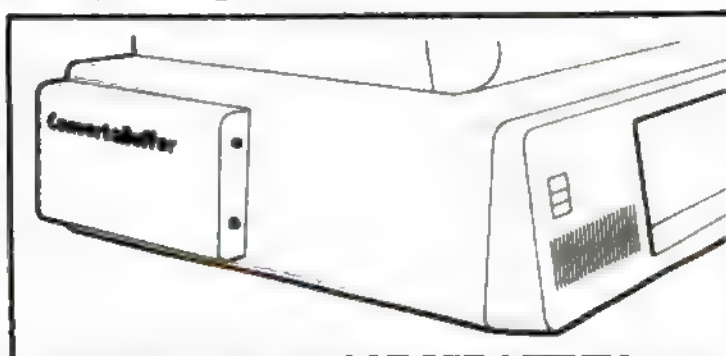


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ConvertaBuffer also features a convenient front panel switch which resets the buffer to abort the printer output if desired. And, the status light indicates when ConvertaBuffer automatically switches to the graphics mode.

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Designer Software from ASID

Interior designers may find a powerful friend in Designwright. Offered bundled or unbundled, this "warmware" package can simplify many design and business operations.

Interior designers of homes and offices face the same problems that any small or medium-sized business faces—estimating, cost accounting, form and letter preparation, and so forth. Interior designers also handle tasks—drafting and designing—that are unique to their line of work. Help for the full range of these interior-designer operations is now available in the form of a personal-computer-based system called *Designwright*.

Designwright was developed by ASID Computer Systems, Inc., a wholly owned subsidiary of the American Society of Interior Designers, Inc., the industry's association headquartered in New York City. Offered as a turnkey system, the

Designwright

ASID Computer Systems, Inc.
1430 Broadway
New York, NY 10018
(212) 944-9232

List Price: Not available for the bundled system.

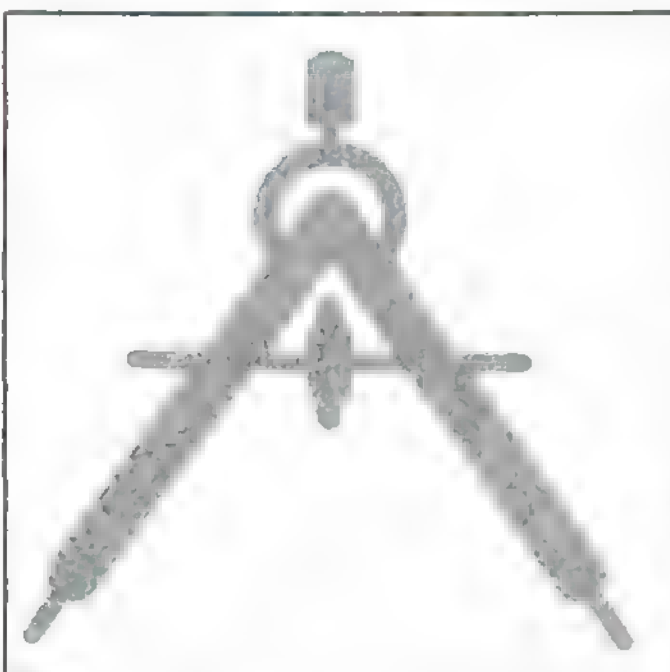
Designword: \$105 (ASID members, \$95)

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Designspec: \$6,875 (ASID members, \$6,250)

Requires: 256K RAM, 10-megabyte hard disk, letter-quality printer.

CIRCLE 681 ON READER SERVICE CARD



package currently consists of four elements: an MS-DOS-based operating system; *Designword*, word processing software based on Satellite Software International's *WordPerfect*; *Designaccount*, an accounting package; and *Designspec*, a computer-aided design and drafting package (CADD).

The system allows designers to take care of the business aspects of their work with greater efficiency while they concentrate more of their energies on the creative and decorative dimensions of each job. Job estimates and proposals, for instance, can be quickly prepared and then readily revised after a phone call from the principals.

Although the *Designwright* packages are all written for MS-DOS systems, ASID customized them for turnkey hard-

ware, the Victor 9000. According to ASID Computer Systems vice-president Martin Farber, the Victor is faster and has a higher-resolution screen than the IBM PC. Farber acknowledges, however, that since Victor's recent bankruptcy filing, more interior designers may take the IBM PC option.

As for software, clients are given a free hand combining the three basic components—*Designword*, *Designaccount*, and *Designspec*. The software is not integrated sufficiently to permit text developed with the word processing module to be used in the CADD module. Nor can accounting data be transferred to the word processing screen. Despite this limitation, the system is user-friendly, with prompts and menus at every step of the way.

One user who has found the *Designwright* system to be friendly is R. Michael Brown Design Associates, Inc., in New York. The firm is using the system to monitor a consulate preservation project in the Bahamas and to help maintain a survey of landmark-quality interiors in New York City. The database is consulted when there's a request to tear down a building, explains Farber.

Keeping Users Satisfied

Foremost among the components that keep users like R. Michael Brown Design Associates satisfied is the *Designspec*



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DESIGN

package. *Designspec* consists of the Touchpen from Sun-Flex Co., Inc., *Autocad* software from Autodesk, Inc., and a single-pen plotter for C- and D-size drawings. It offers two- and three-dimensional black-and-white graphics (color graphics are planned), 1,000 drawing layers, multiple drawing grids, memory overlays, zoom and pan window, architectural and engineering symbol libraries, user-defined symbols, parameterized symbols, dynamic menu selection, and interfaces to standard plotters and dot matrix printers.

Designspec is a general-purpose package, suitable for a variety of applications, including interior design and architectural and landscape drawings. User-defined screen menus are created via ordinary text files, and parts libraries are defined by drawing each entry.

Designspec acts as a word processor for drawings by allowing the user to create and edit drawings of any size and to any desired scale. Users can manipulate and combine both previously created drawing and various geometrical elements—lines of any width, circles, arcs, and solid-filled areas, among others. Drawings are stored on disk and can be output to a plotter or dot matrix printer at any point during the drawing process. They may be annotated with text of any size, inserted at any position and orientation.

Drawings are created and edited through use of commands entered on the keyboard and the Touchpen. The Touchpen is not a lightpen, but rather a capacitance device that identifies x-y positions on a mesh screen. Drawn objects can be moved, copied, modified, erased, rotated, and scaled vertically and horizontally. Repetitive patterns such as brick walls or columns can be generated automatically. The distance between any two points, or the area of a polygon enclosed by any number of points, can be calculated and displayed automatically. Status and list commands display the current status of a drawing or the details of any objects within it.

Despite its word processing capability,

Designspec can not serve as a full-fledged word processor in the way that *Designword* can.

"*Designword* is not for the occasional word processing user," according to Joseph F. Indinemo, executive vice-president of ASID Computer Systems. *Designword* uses function keys and offers special features such as footnotes, headers, math, text columns, spelling check, and merge. A name-and-address sorter is optional.

Designaccount, written to ASID specifications by TLB Associates, includes four basic modules: general ledger, accounts receivable, accounts payable, and address and mailing-list management. Options include job costing, payroll, sales order/invoicing, inventory, purchasing and receiving, fixed assets, sales analysis, and ad-hoc queries and reports.

Not yet on the market is *Designplan*, a facilities planning software package. It consists of nine interconnecting modules, six for planning and implementation, three for management and maintenance.

The *Designwright* system is currently being bought as a standalone system. Although it can communicate with other such systems via a modem and a telephone line, no such communications are currently in use.

Warmware

With all its many features, *Designwright* is neither hardware nor software, according to its creators. Indeed, ASID Computer Systems has applied for a trademark for the word *warmware* to characterize its product. The term accurately captures the extensive handholding that takes place with each client to guarantee a perfect fit between client needs and the system that is purchased. Part of the handholding is a mandatory training option, which trains one person per site for up to 12 hours.

"We will not sell a system before its time," says Indinemo. Interior designers must now consider whether it is time for *Designwright*.

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Computer Innovations
980 Shrewsbury Avenue
Suite J-505
Tinton Falls, NJ 07724

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CIRCLE 164 ON READER SERVICE CARD

New on the Market

HARDWARE

OptoMouse

A digital mouse cursor-positioning device. It can be programmed to output any combination of ASCII codes. As a result, the mouse can control program operations by performing up to four commonly used functions at the touch of a button.

The OptoMouse features four button switches whose control code output to the user's system can be programmed to simplify such tasks as using menus, editing, entering data, etc. Special function keys and direct command codes can also be assigned to the switches.

Another feature of the OptoMouse is a monitor mode, which displays the directional output from the mouse as a series of arrows on-screen, visually confirming the device's operation. The user can directly address input/output ports, control the sensitivity of the device, and specify what control codes will be output from both the device's function keys and movement of the mouse.

(List Price: \$299)

USI Computer Products
71 Park Ln.

Brisbane, CA 94005

(415) 468-4900

Telex: 27 8968

CIRCLE 735 ON READER
SERVICE CARD



OptoMouse, USI Computer Products

UNICAD-1

A software/hardware package that enables electronic engineers to design and simulate gate arrays. The package consists of design software, as well as a Universal ISO 3/5 library of macrocells, a high-resolution printer, a graphics driver board, a digital mouse, terminal emulator/communications soft-

ware, and operating manuals.

With UNICAD-1, a systems engineer can develop a logic design, capture it, and convert it to a network listing. This net listing can be subsequently transmitted via modem to a central CAD (computer aided design) system, where logic and circuit simulation, test generation,

and fault simulation can be performed. Results of tests can be received on the user's system for printout. Edits and resimulations of circuits can be performed interactively from the user's system via the communications link.

The UNICAD-1 system is designed to work with a VAX-based Universal CAD

HARDWARE

network, though its simulated net list output is compatible with any gate array design system.

(List Price: \$7,000)

Universal Semiconductor Inc.

1925 Zanker Rd.

San Jose, CA 95112

(408) 279-2830

CIRCLE 736 ON READER
SERVICE CARD

HiFi Mouse

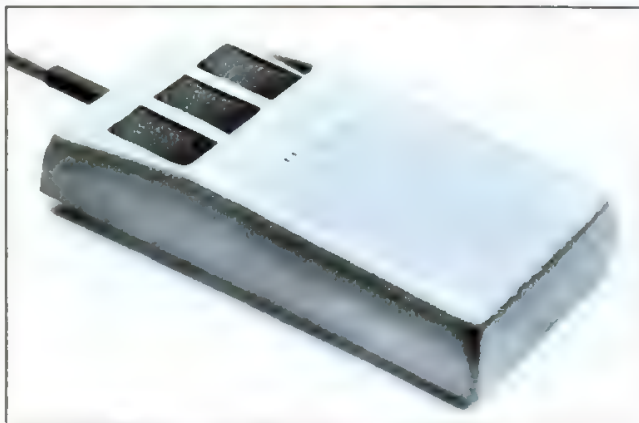
A digital, cursor-controlling mouse capable of operating on any surface. The device does not use mechanical potentiometers, balls, or shafts which may lead to mechanical failures. Instead, the HiFi Mouse uses two proprietary sensory devices to detect the distance and the direction of movement over a surface.

The bottom of the mouse senses direction by measuring the slight drag due to contact with a surface. It is covered with a suede pad, the fibers of which create sound as they pass. Detection of the amplitude of the sound, within a selected frequency band, provides a measure of speed. When integrated with time, distance is measured. An on-board microprocessor combines the speed and distance signals with direction indication to provide instructions for the movement of the cursor on the CRT screen.

The device also incorporates three software-control-



UNICAD, Universal Semiconductor Inc.



HiFi Mouse, Display Interface Corp.

lable pushbutton switches and an integral five-foot cable terminating in a standard RS-232 connector. Other switch arrangements and interfaces are available as options.

(List Price: \$195; Power Supply \$30)

Display Interface Corp.

1770 Post Rd.

Milford, CT 06460
(203) 877-7661

CIRCLE 711 ON READER
SERVICE CARD

ComScriber I Plotter

A single-pen plotter that draws at a speed of up to six inches per second, with step-increments accurate up to 1/4000ths of an inch.

The ComScriber I Plotter,

Model CR-1810, can use either manufacturer-supplied or commercially available standard pens, paper, and transparencies. A pause feature permits the user to change pens easily during a print run.

The plotter can accept paper sizes 8½ inches wide by up to 10 feet long, and can produce a variety of alphanumeric and geometric shapes. The movements of the pen can be controlled from the user's system, or via twelve touch-key controls on the front panel.

(List Price: \$695)

Comrex International Inc.

3701 Skypark Dr.

Torrance, CA 90505

(213) 373-0280

CIRCLE 712 ON READER
SERVICE CARD

PC Mark Optical Mark Reader

A tabletop optical mark reader capable of scanning through up to 3,600 documents an hour. The unit's automatic feed can accept and handle 200 documents at one time, ranging in sizes from 2 × 4 inches to 9 × 12 inches. It will adjust automatically for paper thickness, and self-checks for document length and double feed.

The OMR/25 scanner is packaged with test-scoring software, and other software packages are available for such applications as attendance reporting, academic

HARDWARE

course scheduling and grade reporting.

(List Price: \$8,500)

Cognitronics Corp.

25 Crescent St.

Stamford, CT 06906

(800) 243-2594

(203) 327-5307

CIRCLE 713 ON READER
SERVICE CARD

10-NET

A local area network (LAN) system, consisting of hardware and software that permit multiple users to link their systems via inexpensive twisted-pair wire at transfer rates up to 1 megabyte per second. Any user of the network may choose to either allow other systems to access its resources, or be disconnected from the LAN without affecting others sharing the lines.

Installation of the 10-NET LAN simply requires that each user install an interface board, attach the board's cable to a tap box, and load the system software. The 10-NET software operates as a batch file, or can be made to prompt the user through a question-and-answer session to establish system parameters and detail the configurations of hardware attached to the user's system. The software operates in a transparent layer between the user and the PC-DOS operating system, permitting all normal DOS functions to run locally as well as across the network.



PCMark Optical Character Reader, Cognitronics Corp.

(List Price: Single-system
kit \$695)

Fox Research, Inc.

7005 Corporate Way

Dayton, OH 45459

(513) 433-2238

CIRCLE 714 ON READER
SERVICE CARD

Storex SX410 Cartridge Drive

A 5¼ inch mass storage device with formatted storage capacity of 5 megabytes fixed and 5 megabytes removable. The unit is designed to take advantage of the extended features of the Memorex Minimark rigid disc cartridge. These cartridges are sealed against contamination until safely locked inside the drive; only then does the access door open to admit the heads.

The SX410 averages a 40 milliseconds data access time, with a Mean Time Before Failure (MTBF) rat-

ing of 8,000 hours.

(List Price: \$3,995)

Storex Corp.

999 Independence Ave.,

Bldg. E

Mountain View, CA 94043

(415) 961-1980

CIRCLE 715 ON READER
SERVICE CARD

Speak Easy

A speech synthesizing board and software package, enabling the user's system to speak and perform telephone functions. The device digitizes the human voice from incoming calls, and can store messages on-disk. Alternatively, the device can accept messages from the user for outgoing calls, store them on disk, and play them back over phone lines following appropriate prompts from the person at the other end of the line.

Speak Easy can identify a touch-tone digit or sequence

of digits entered by a caller and play back only those messages intended for that caller.

The device can also, on instruction from the user's system, automatically place calls (using either pulse or touch-tone lines), and deliver messages to one or a number of phone numbers. Receipt of the message can be confirmed by the recipient by a touch-tone signal.

Other features of the device permit the user to review incoming messages via a local telephone, from a remote phone, or by instructing Speak Easy to call the user at a particular number and deliver the messages.

(List Price: \$795)

CMC International, Inc.

1720 130th Ave. N.E.

Bellevue, WA 98005

(206) 885-1600

CIRCLE 743 ON READER
SERVICE CARD



PC Hard Disk Subsystems, Tandon Corp.

PC Hard Disk Subsystems

Two Winchester hard-disk drives, available with either 10 or 15 megabytes formatted storage capacity. The devices, designated models TM5112 (10MB) and TM5113 (15MB), also include a controller with SCSI interface, a separate power supply, and an adapter board designed to fit within an expansion slot.

(List Price: TM5112 \$1,995; TM5113 \$2,295)

Tandon Corp.
20320 Prairie St.
Chatsworth, CA 91311
(213) 993-6644
TWX: 910-493-5965

CIRCLE 741 ON READER
SERVICE CARD

MicroGate 742

An integrated hardware/software package providing emulation of a Texas Instruments 742 terminal, using TI block mode communications protocol. MicroGate 742 permits a user's system to be placed into the unattended batch environment of the Texas Instruments Model 700 TPS or Model 704/1 TPA Terminal Polling System network, or other host-controlled 742 polling network.

MicroGate 742 consists of a Gateway serial communications controller, a modem cable, and a diskette with proprietary communications software.

(List Price: \$645)

Requires: Bell 202S or equivalent modem.

Gateway Microsystems Inc.
9501 Capitol of Texas Hwy.
Austin, TX 78759
(512) 345-7791

CIRCLE 744 ON READER
SERVICE CARD

ABS 200 EPM Printer

A thermal printer capable of printing up to six pages per minute of text and graphics on plain paper. The printer can produce images using a 40,000 dot-per-square-inch matrix. Features include multiple fonts and type sizes and an auxiliary manual input permitting the printing of envelopes and labels.

(List Price: \$2,195)

Ampak Business
Systems, Inc.
2640 Walnut
Tustin, CA 92680
(714) 731-4217

CIRCLE 745 ON READER
SERVICE CARD

Pro-Comm Switches

A line of serial RS-232 line switches, permitting serial devices to be used by a single port in the user's system. The PRO-COMM line includes two-, three-, and four-way switches for the 25-pin RS-232 interface.

The Two-Way (AB), Three-Way (ABC), and Four-Way (ABCD) switches are available in a basic standard configuration, in either standalone plastic enclosures, or in flange mounts for installation in a 19-inch rack system. Optionally, the switches can be ordered with six L.E.D. indicators monitoring the data and control status lines on the common port. Another option is a second D-25 connector in parallel with the common port, for remote status monitoring. These options are available singly or in combination in the same unit.

The common and output ports can be ordered in any combination of male and female connectors needed. The standard switch, which connects and disconnects the twelve most commonly used pin leads, is designed to fit

The Rixon PC212A... The Perfect Modem For Your IBM® PC ...Only \$499

The Rixon® PC212A offers you the only 300/1200 BPS full duplex card modem with auto dial and auto answer that plugs directly into any of the IBM PC®* card slots. Because the Rixon PC212A was designed specifically for the IBM PC, it is loaded with user benefits.

The PC212A eliminates the need for an asynchronous communications adapter card and external modem cable, this alone saves you approximately \$190. The PC212A provides an extra 25 pin EIA RS232 interface connector, a telephone jack for alternate voice operation, and a telephone line jack for connection to the dial network.

Without question, the PC212A is the most user friendly, most reliable, and best performing modem for your IBM PC. An internal microprocessor allows total control, operation, and optioning of the PC212A from the keyboard.

A user friendly HELP list of all interactive commands is stored in modem memory for instant screen display. Just a few of the internal features are auto/manual dialing from the keyboard, auto dial the next number if the first number is busy and instant redial once or until answered.

In the event of power disruption a battery back-up protects all memory in the PC212A. In addition, the PC212A is compatible with all of the communication programs written for the Hayes Smartmodem™**such as CROSSTALK™†. Also available for use with the PC212A is the

Rixon PC COM I,™‡ a communications software program (Diskette) and instruction manual to enhance the capabilities of the PC212A and the IBM PC. PC COM I operates with or replaces the need for the IBM Asynchronous Communications Support Program. The program is very user friendly and provides single key stroke control of auto log on to multiple database services (such as The SourceSM&), as well as log to printer, log to file transfer and flow control (automatic inband or manual control). PC COM I is only \$49.00 if purchased at the same time as the PC212A. The PC212A comes with a 2 year warranty. For more information contact your nearest computer store or Rixon direct at 800-368-2773 and ask for Jon Wilson at Ext. 472.

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- ** Hayes Smartmodem is a product of the Hayes Stack™ series, a registered trademark of Hayes Microcomputer Products Inc.
- † CROSSTALK is a trademark of Microstuf Inc.
- ‡ PC COM I is a trademark of Rixon Inc.
- & The Source is a servicemark of Source Telecomputing Corp.

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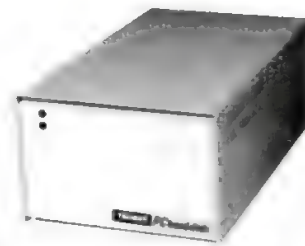
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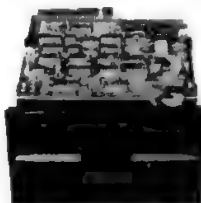


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TM 100-2

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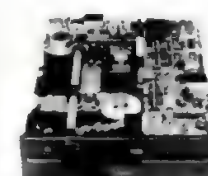
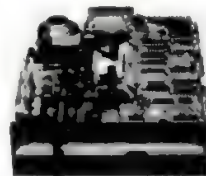
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Tandon

TM 50-2

\$200

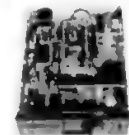


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HARDWARE

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each)

HADAX Products, Inc.
79 Hazel St.
Glen Cove, NY 11542
(516) 676-3386

CIRCLE 740 ON READER
SERVICE CARD

POPCOM X100 Modem

A voice/data switching modem, compatible with Bell 103, 113, and 212A protocols. The unit can automatically sense when the local telephone handset has been lifted, and switches from data transfer to voice mode, even on the same telephone call. The voice and data switching capability of the device eliminates the need to make multiple calls, or to have separate phone lines installed for voice and data transfers.

The POPCOM model X100 unit can be wall-, desk-, or floor-mounted, and connects to the user's system via an RS-232 communications port.

(List Price: \$475)

Prentice Corp.
266 Caspian Dr.
P.O. Box 3544
Sunnyvale, CA 94088
(408) 734-9810

CIRCLE 742 ON READER
SERVICE CARD



Pro-Comm Switches, Hadax Products, Inc.



POPCOM X100 Modem, Prentice Corp.

PC Modem Half-Card

A small internal modem, designed to fit the short slot of the PC/XT. The modem includes full auto-dial, auto-answer features, and can operate at either 300 or 1200 baud. Its command set is compatible with that of the Hayes Smartmodem.

The PC Modem Half-Card is bundled with the *Crosstalk-XVI* communications program, which features automatic dialing and logon, terminal emulation, and automatic data capture, from any ASCII computer. In addition, the software permits the user to store a series of tasks for the modem in a single keystroke.

(List Price: \$549)

Ven-Tel, Inc.

2342 Walsh Ave.

Santa Clara, CA 95051

(408) 727-5721

CIRCLE 739 ON READER
SERVICE CARD

DecisionLink/34

A bidirectional interface between a user's system and an IBM System/34 mainframe system. The device uses a single SDLC communications channel to connect its front-end processor to the mainframe system. The mainframe's operator then configures the system and determines the access levels and security procedures for up to 16 PCs linked to the DecisionLink/34's controller via modem



PC Modem Half-Card, Ven-Tel, Inc.



DecisionLink/34, Laguna Laboratories, Inc.

or cable lines.

The DecisionLink/34's controller module performs communications multiplexing, file translation, code conversion, system security, and directory maintenance tasks. Each PC linked to the system is provided a soft-

ware module that permits data files to be transferred to or from the mainframe. All data is translated into the formats required for processing by application software. Also included with the software modules are print spooling and message

handling features.

(List Price: \$8,000 average system)

Laguna Laboratories, Inc.

1300 Normandy Pl.

Santa Ana, CA 92705

(714) 835-9100

CIRCLE 737 ON READER
SERVICE CARD

OZ Guardian Modem

A full-duplex, 1200 baud modem with security provisions for protecting sensitive data. The modem's security features include answer verification, where the device automatically screens incoming calls for a valid password before a call is connected. An optional "call back" feature is available, allowing the modem to automatically disconnect incoming calls after receiving the caller's password and then to dial the number in its memory associated with the caller's password.

Other security-oriented features of the OZ Guardian include non-displayable fields to prevent network users from accessing confidential directory data; command-locking, to prevent the implementation of selected commands; and password-controlled master locking, to prevent unauthorized users from unlocking those commands.

The modem can also accept remote configurations from a central site via the telephone line, with the ap-

propriate password.

(List Price: \$750)

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(415) 969-3700

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SOFTWARE

BOOKS! The Electric Ledger

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BOOKS! also permits the user to scan or add to a chart of accounts without leaving an account file, and without requiring the chart of accounts to be placed in a Restructure mode.

(List Price: \$345-\$745)

Requires: 128K, two disk drives, PC-DOS.

Systems Plus Inc.

1120 San Antonio Rd.



BOOKS! The Electric Ledger, Systems Plus, Inc.

Palo Alto, CA 94303

(415) 969-7047

TWX: 910-379-5060

CIRCLE 716 ON READER
SERVICE CARD

Home Money Management Programs

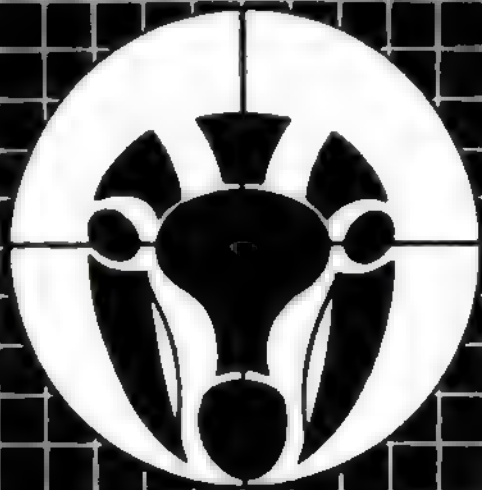
Three programs for home money management use. The simplest of the programs, *Personal Payables*, handles checking and savings accounts, and prints checks with addresses for window envelopes. The second program, *Certified Personal Accountant*, handles bill paying, cash flow and

tax computations, money market and credit card accounts, and a simple stock portfolio. The third program, *Certified Personal Investor*, tracks returns on stocks, long- and short-term gains and losses, and dividends, and produces information for personal income tax returns. The three programs are integrated, permitting basic information entered into one program to be automatically transferred to the others.

The bill-paying program, *Personal Payables*, can handle up to 10 separate checking and savings accounts,

dozens of different recurring or one-time bills, and can store more than 1,000 transactions on a single diskette. The program tells the user when bills are due to be paid, and with the addition of a check handling holster (available from the software's producer) and a printer, the user can print on regular personalized checks or any continuous form of checks. The software also produces financial reports by any combination of check, date, payee, or tax category.

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SalesCTRL, Computer Task Group, Inc.

paying bills, prepares budgets, reports on net worth, cash flow, income and expense statements, and tax information.

The Certified Personal Investor program can track as many as 150 different investments. At tax time it can automatically print out information for the 1040-B interest reporting and the 1040-D capital gains forms. (List Price: *Personal Payables* \$49.95; *Cert. Personal Accountant* \$99.95; *Cert. Personal Investor* \$149.95)

Requires: 64K, one disk

drive, PC-DOS.
Sundex Software Corp.
3000 Pearl St.
Boulder, CO 80381
(303) 440-3600

CIRCLE 717 ON READER
SERVICE CARD

SalesCTRL

A sales management program, combining list handling, database management, word processing, and automatic telephone dialing features into a single system. Simplified messages and menus enable the user to establish a database that

includes descriptive and historical information on each sales prospect, using up to 30 criteria. The user may employ the standard database included with the software, or create one to suit specific business needs.

SalesCTRL allows the user to add, delete, modify, sort, display, or print stored data. The software permits inquiries on particular prospects, and can generate customized reports on a selective group of prospects using any criteria contained within the database. An in-

corporated text processor assists in creating personalized sales or follow-up letters.

(List Price: \$299)

Requires: 128K RAM, two 320K drives, USCD p-System (included).

Computer Task Group Inc.
800 Delaware Ave.
Buffalo, NY 14209
(716) 882-8000

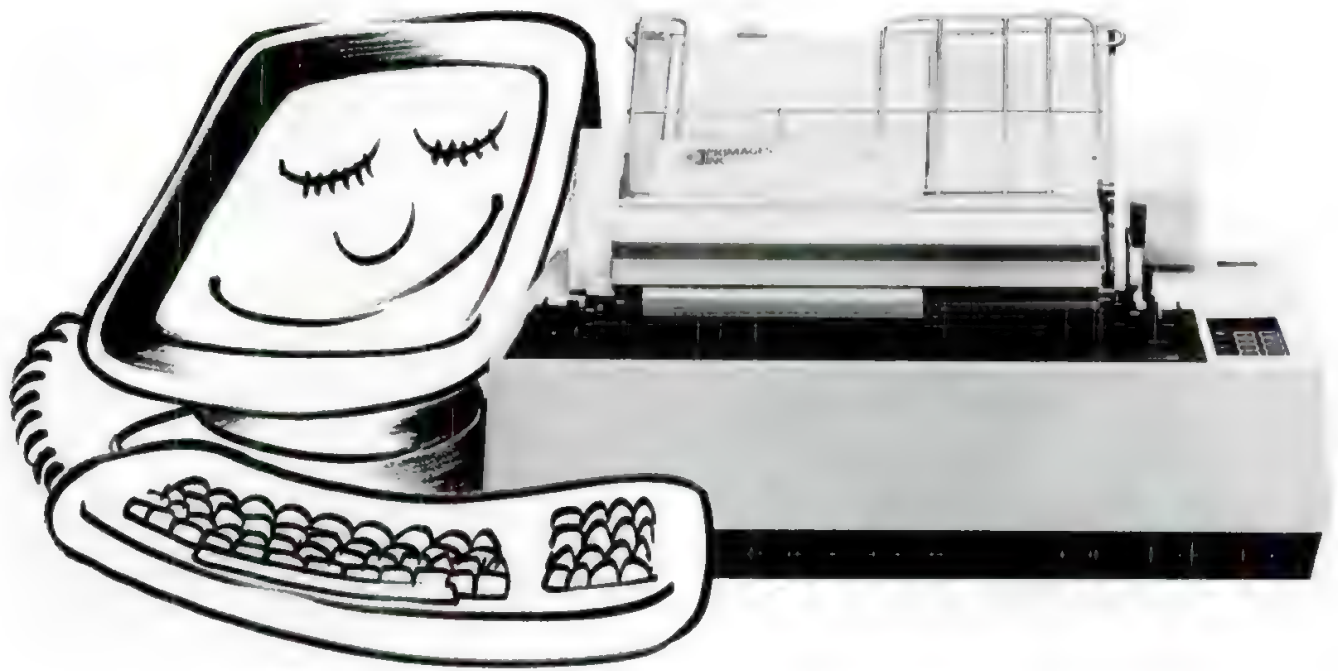
CIRCLE 746 ON READER
SERVICE CARD

Electronic Mail Manager (EMM)

A communications program for multi-branch business offices and other applications where the participants are at different physical locations. *EMM* provides a private electronic mail network and is used in conjunction with the producers' *COMM*X (*COMM*unications *eX*change) software. Information can be transferred error-free between all locations at predetermined times, allowing users to take advantage of low phone rates. The software is written in *dBASE II*, and provides the user with a menu-driven format.

At each branch location, users are assigned a mailbox number which requires a password for the system to operate. Users may only access data information addressed to or by their mailbox. Local managers are assigned a system password which permits privileged system operations. A total

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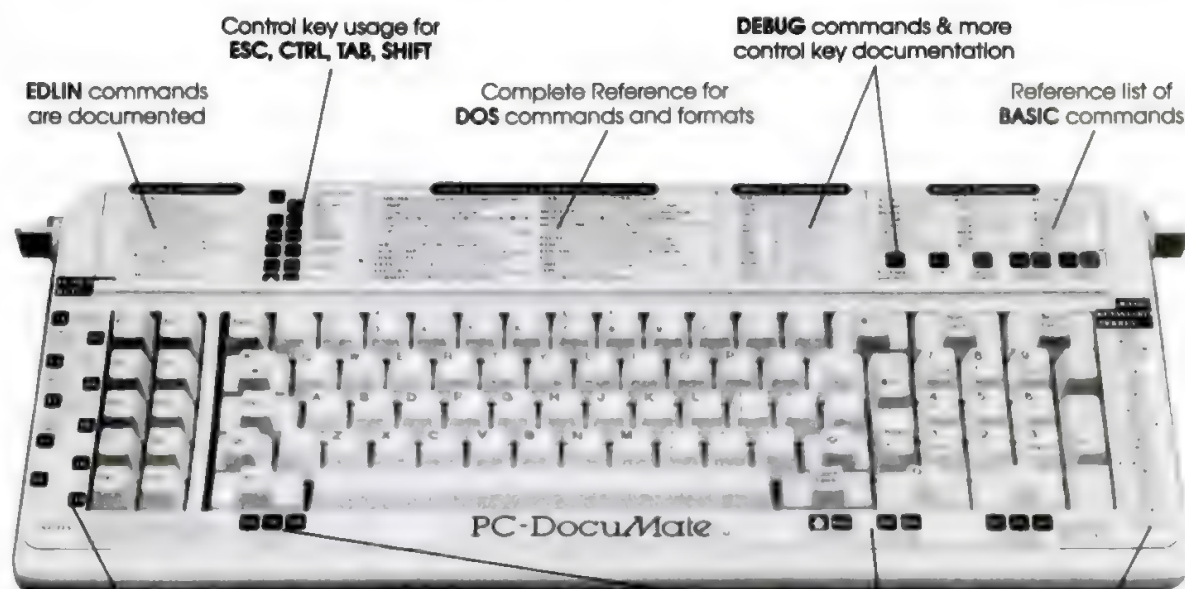
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Systems Management Associates
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P. O. Box 20025
Raleigh, N. C. 27619

of 1,000 mailboxes can be assigned on the network, one of which serves as the master station.

The master station on the network serves as the system control point, and can assign or alter the branch or mailbox designations and database. Verification of source and destination mailbox is made via this database, with updates automatically transmitted to all locations.

EMM features include a full-screen "memo" editor providing up to 11 lines of 79 characters each, with up to 15 copies deliverable to other mailbox destinations. A return receipt feature allows verification of important items, and a special delivery option allows immediate transmissions of tagged items to any branch locations. Files programs such as *WordStar* can be attached to memos for transmission. *EMM* automatically archives incoming and outgoing memos.

The software is available with *dBASE II* source code, or with a *RunTime* module for users without *dBASE II*. (List Price: Two-System Starter Kit \$440; Additional Slave Modules \$100; Run-Time Module \$150)

Requires: 64K, two 320K drives, PC-DOS or CP/M-86, either *dBASE II* or *Run-Time* Module, Hayes Smartmodem or equivalent.

Hawkeye Grafix



Advanced DB Master, Stoneware, Inc.

23914 Mobile
Canoga Park, CA 91307
(213) 348-7909
(213) 634-0733

CIRCLE 718 ON READER
SERVICE CARD

Advanced DB Master

A database management program permitting the user to store, search, restructure, and calculate data without programming knowledge. The software can handle files large enough to fill 44 floppy diskettes, or approximately 16 megabytes.

Advanced DB Master features include keystroke macros, text editing and text merging, computed fields, user-defined reports, dynamic value tables, array searches, audit trail creation,

screen forms, a browse mode, required fields, error prevention, different field types, a print buffer, and the ability to exchange data with other programs as well as with other computers.

(List Price: \$595)

Requires: 256K RAM, two 320K drives, PC-DOS.

Stoneware, Inc.

50 Belvedere St.

San Rafael, CA 94901

(415) 454-6500

CIRCLE 747 ON READER
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CAD from CENTERPOINT

A graphics plotting program which can create, store, and plot any shape on a plotter. Location, rotation and size can be altered with single

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CAD from CENTER-POINT is compatible with the following plotters: Hewlett Packard 7470 and 7475; Sweet P and Six Shooter; Mannesmann Tally Pixy 3; Amdek Amplot II; and Houston Instruments.

(List Price: \$149)

Requires: 64K, one drive, PC-DOS, plotter.

Centerpoint Computer Applications

500 N. Michigan Ave.

Chicago, IL 60611

(312) 467-0333

CIRCLE 719 ON READER
SERVICE CARD

Sequitur

A relational database management system (DBMS) that does not require the user to learn a programming or query language. *Sequitur* permits files with up to 255 records each, with total storage capacity limited only by the capacity of the user's system. The DBMS stores to disk only the actual characters that have been entered, creating variable length records that save disk storage space.

Sequitur includes a report generator for formatting and printing reports and performing basic calculations on stored data. A forms

SOFTWARE

generator allows the user to prepare form letters and documents containing data from the database files. It can also print labels for mailing lists, and can merge a form letter with a mailing list. The DBMS can also interface with any word processing system to produce more complex documents.

(List Price: \$795)

Requires: 256K RAM, one 320K drive, PC-DOS.

Pacific Software Mfg. Co.
2608 Eighth St.

Berkeley, CA 94710

(415) 540-5000

Cable: **PACIFIC**

CIRCLE 774 ON READER
SERVICE CARD

COMMx

A menu-driven terminal and file transfer program for accessing and transferring data to and from other users' systems and mainframes. Disk file transfers of any type and size (including those with wildcard names) can be performed error-free using the **COMMx** protocol at both sites. Auto-dialing, with log-in parameter files, baud rate selection and originate/answer functions are supported. Other features include a session disk log file, keyboard macro files, a received-character filter, and primer toggles.

COMMx supports Telex and TWX through Western Union's Easylink access network; Electronic Mail via the U.S. Postal Service's E-



COMMx, Hawkeye Grafix



ASAP Five, ASAP Systems, Inc.

COM system; XON/XOFF and XMODEM communications protocols; as well as programmable line continue prompt or line delay, speed throttle, full echo wait, and DC2/DC4 receive control communications modes.

The software also includes "D," which is a replacement program for the "DIR" command of PC-DOS and CP/M-86. "D" provides an 80-column wide, alphabetically-arranged directory of disk

files, showing the size of each file as well as space used on the disk and space remaining.

(List Price: \$150)

Requires: 17K RAM, one disk drive, PC-DOS, serial port, Hayes Smartmodem or equiv.

Hawkeye Grafix

23914 Mobile

Canoga Park, CA 91307

(213) 348-7909

(213) 634-0733

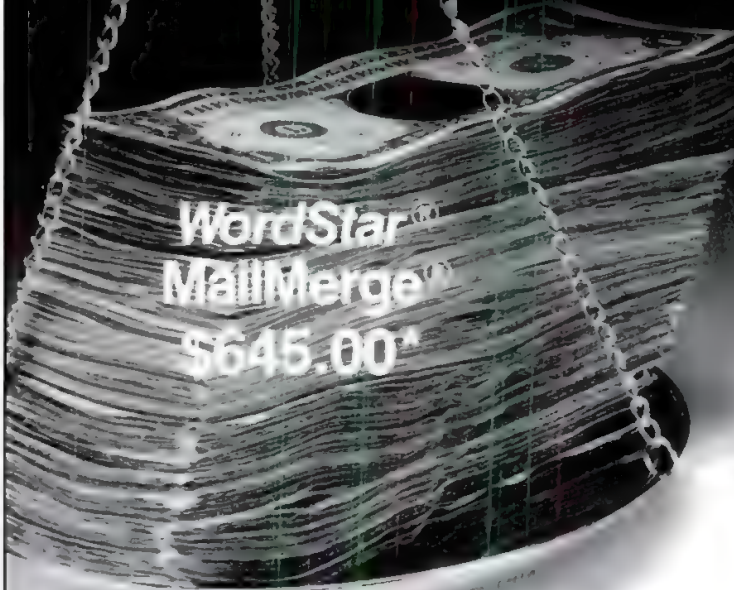
CIRCLE 749 ON READER
SERVICE CARD

ASAP FIVE

A database management system, designed to allow users to produce reports easily. The system asks the user for names of data items, types of items (text, numerical, date, money, or calculation), and length. The system automatically puts the data items into appropriate files, permitting data entry to be started immediately. The screen can later be modified to add or delete data, or change existing data fields.

Integrated word processing functions allow the system to generate quick reports by pressing single keys. Custom reports can be created through the use of question and answer sessions, which provide different user-controlled run options. Specialized functions, such as mailing labels, form letters, and custom-designed

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There's only one main difference: worth. Because NewWord, with its built-in Merge Print, is entirely compatible with MicroPro's WordStar[®] and MailMerge[®]—keystroke, command and file compatible. You can use an associate's Wordstar files without any difficulty.

NewWord is the most powerful and versatile word processor available. Beyond WordStar's editing and formatting capabilities, NewWord also offers advanced features like unerase deleted text, automatically changing ruler lines, multiple-line headers and footers, and on-screen display of boldfacing and underlining.

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AMBER SCREEN

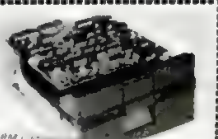
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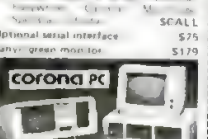
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\$227 \$267 \$317 \$367 \$417 \$467 \$517

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MegaPlus II Cards

Amount of memory installed on board

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128K JRAM board with 128K RAM

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LENIPEN/XT & LENIPEN/Jr., Duncan-Atwell

invoices, are provided by the system as well.

An implementation of "Universal Relation" technology, the system is, to a considerable extent, programmer-less. It automatically indexes, arranging data items into files and files into databases.

(List Price: \$395)

Requires: 192K RAM, two 320K drives, PC-DOS 2.0.

ASAP Systems, Inc.
2425 Porter St., #14
Soquel, CA 95073
(408) 476-3935

CIRCLE 753 ON READER
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LENIPEN/XT & LENIPEN/Jr

Two color graphics systems which allow users to perform color graphic functions using natural human capabilities such as visual association, pointing, and audio association. The system can make use of popular graphic input/output devices such as lightpens, digital mice, special color/graphics cards, joysticks, digitizing tablets, and a digitizing camera.

Optional support is also provided for color printers and plotters.

The system uses the pro-

ducers' Symbolic Online User Language (SOUL), an ICON-based language designed to appeal to the user's sense of symbolic association. ICONs depicting the type of graphic function to be executed are displayed in symbolic command sets at the bottom of the screen. The ergonomic pointing devices listed above can be used to point to these ICONs and quickly execute the graphic functions. No typing is required, as the keyboard is used primarily as a graphics options supervisor, with one-touch musi-

cally-coded toggles and multi-level graphic selectors.

A noteworthy feature of the system is its ability to automatically generate graphic programs while the user is creating graphic images on the screen. These programs consist of ASCII strings that echo the actions of the user during the course of image creation. The programs can then be saved to disk or cassette, recalled to recreate the user's images, or communicated to other users of SOUL.

LENIPEN/XT is designed to take advantage of the storage capacity of a hard-disk drive system. It has a dynamic pixel editor, flow-charting and circuit design editor, business graphics, an animation subsystem, and a slide presentation facility. *LENIPEN/Jr*, a scaled-down version for use with the IBM PCjr and compatibles, is designed to be of particular use to artists, designers and architects. Both systems provide five levels of free-hand art, electronic crayons, grid generation, color mixing and randomization, painting, graphic windowing, image coupling, and high-resolution drawing features.

(List Price: *LENIPEN/XT*, \$695; *LENIPEN/Jr*, \$345)

Requires: *LENIPEN/XT*: 128K RAM, one disk drive, PC-DOS, color monitor, color/graphics adapter; *LENIPEN/Jr*: 96K RAM;

other requirements same as above.

*Duncan-Atwell
Computerized Technologies,
1200 Salem Ave.
Hillside, NJ 07205
(201) 355-1690*

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The Oddsmaker

A parimutuel betting program for up to 14 betting pools in a single betting event. *The Oddsmaker* accepts bets, prints tickets, and calculates the odds and payouts. In addition, it can automatically deduct the "house cut" before payouts are calculated. All the information for a betting event can be saved to disk, permitting the software to handle up to 14 different betting events simultaneously.

The software can display a number of information screens while bets are entered. Screens include the current odds, payouts, and amount bet for each pool, as well as user-designed announcements. Information screens are instantly updated as each bet is entered.

(List Price: \$44.95)

Requires: 64K RAM, one disk drive, PC-DOS.

*CZ Software
358 Forest Rd.
S. Yarmouth, MA 02664
(800) 225-7136
(800) 352-7787 in Mass.*

CIRCLE 752 ON READER
SERVICE CARD



Financial Planning Mind Tools, Howard W. Sams & Co., Inc.

RXSet

A printing program for user's systems equipped with an Epson RX-80 dot matrix printer. *RXSet* permits setting of printer control codes through a series of interactive screens. Page length, margins, line and character spacing parameters, as well as the various type fonts available from the Epson printer, can be easily set or changed. *RXSet* also provides the user with a current status report of the printer's parameters, with warnings where such parameters may be incompatible with an application.

RXSet features also permit insertion of desired parameters and print codes

within a user's text files, which can simplify the printing of files requiring parameter changes.

(List Price: \$12)

Requires: 64K RAM, one disk drive, PC-DOS 2.x, Epson RX-80 printer.

*On Disk Software
P.O. Box 382
Lincoln, MA 01773*

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Financial Planning Mind Tools

A collection of specialized overlays for Lotus' *1-2-3* spreadsheet program, capable of performing 18 kinds of financial calculations, including present value, net present value, future value,

yield, internal rate of return, break-even analyses, mortgage calculations, depreciation schedules, and amortization tables.

The series is designed to be easy to use. Sample screens and numerous examples are included for each calculation. Information developed with this package can be used in the *1-2-3* program's graphics and information management functions.

(List Price: \$79.95)

Requires: 128K RAM (*1-2-3* ver. 1); 192K RAM (*1-2-3* ver. 1A); two 320K drives, PC-DOS, Lotus *1-2-3*.

*Howard W. Sams &
Co., Inc.
4300 West 62 St.
Indianapolis, IN 46268
(317) 298-5400*

CIRCLE 748 ON READER
SERVICE CARD

ACCESSORIES

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Covers are available to fit Epson, NEC, Smith-Corona, IBM, and other printers, and do not produce static electrical charges.

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FLOPPY INTERFACE

This is the standard Floppy Interface Card supplied in all systems not using Tape Back-up. It can access up to four drives in 48 or 96 TPI formats. The same high quality data separator as used in IBM™ counterparts, insures data integrity. BOA-6001-00.....\$255.00

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This super reliable, four layer design Memory Card can be expanded from 64K to 576K in 64K increments (at \$75.00 ea.). We've tested them all and can recommend this one with confidence. The price below is with 64K and includes Spooler and RAMDISK software. BOA-8650-00.....\$255.00

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This simple but effective Card should be ordered with every system. Battery Back-up (naturally) keeps your Disk Log right up to date. Saves typing in the date everytime you "boot up" the system. BOA-8700-00.....\$149.00

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If this is your first computer, you will soon want it to Communicate. Compuserve and The Source are on your screen minutes after you plug-in this Custom Made Unit. Supplied with cable to plug into any wall outlet. Auto-Dial Software "remembers" phone numbers and log-in sequences to ease operation. Software included for each operating system. BOA-8725-00.....\$295.00

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Now we need a full page to describe this fantastic Card! Since we only have a little room, here are the features: IBM™ compatible Joystick Port (2), Real-Time Chronograph (Battery Back-up), Parallel Port, Serial Port, 64K to 384K of Parity Memory, Print Spooler and RAM-DISK software, and supplied with OK of Memory. BOA-8680-00.....\$345.00



MANUFACTURING

HARD DISK ADD-ON Complete Packages

Includes BIOS Software, 5 1/4" Winchester Hard Disk, mounting hardware, Interface P.C.B. for expansion slot, and all the necessary power and data cables (the Power Supply in the **XPC-XT** is Hard Disk ready).

10 Megabyte	65 Megabyte
\$995	\$2495
20 Megabyte	105 Megabyte
\$1295	\$3295
40 Megabyte	140 Megabyte
\$1795	\$4195

Archive Tape Back-up unit shown above is of 20 and 40 megabyte capacity. Memtek unit will soon be available at 10 megabyte capacity at approximately One-Half the cost!

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If you are impressed with all the rave reviews that the Hercules Graphics Card gets, you will love ours! Made expressly for the **XPC-XT** by Hercules themselves, it runs everything the Hercules Card does (1-2-3™, dBase II, etc.). BOA-8500-00.....\$395.00

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Color and monochrome combinations, can be run simultaneously. Flight Simulator™, 1-2-3™ all perform without modifications. **NO FLICKER!** Besides performing perfectly, included are: Light Pen Interface, Print Spooler, and RAM Disk options! BOA-8400-00.....\$495.00

COLOR

MON-1500-00 \$345.00



Three models of Color to choose from, each with higher and higher resolution. Price from \$345.00 to \$750.00. Monochrome Unit is outstandingly clear and easy on the eyes. In Green or Amber screens.

MONOCHROME

MON-1000-00 \$125.00



HARD DISK ONLY INTERFACE

A simple, quick solution to adding a Hard Disk to your **XPC**. All you need is this card, a Cable, and the Drive. Handles from 5 to 140 megabytes with minimum software configuration. Order with your System now or order later. Compatible with all the operating systems. BOA-8050-00.....\$375.00

H.D./TAPE CONTROLLER

This package consists of a combination Interface Adaptor having SCSI H.D./TAPE Connector as well as the Floppy Controller. Two additional 5" form factor Boards are included and mount over the Tape Drive and Hard Disk. 10, 20, & 40 megabytes of Back-up is added to your Hard Disk. BOA-8675-00.....\$750.00

XDS Manufacturing ■ 5791 Machine Drive ■ Huntington Beach, CA 92649 ■ 714/898-0336

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(List Price: \$12.50)
Discovery Design Center
P.O. Drawer 72289
Roselle, IL 60172
(312) 893-5468
(312) 529-9014

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SERVICE CARD

Magic Computer Input/Output Mug

A coffee mug for "computer experts." Before it is filled with hot liquid, the mug displays the words "Computer Expert On Duty." As soon as the mug is filled with hot coffee the words vanish. The pictured computer screen, which was originally blank, suddenly displays the words "Expert Off Duty." When the mug cools, the message on the screen disappears, and the original ("default") message reappears. The 10-ounce mug comes in three versions: Computer Expert On/Off Duty; Programmer On/Off Duty; and Computer Nut On/Off Duty.

(List Price: \$8.95)

Sweet Gum

15490 N.W. 7th Ave.

Miami, FL 33169

(800) 237-9338

(305) 687-9338

CIRCLE 782 ON READER
SERVICE CARD

Windsor PC Roll Top Desk

A solid oak desk that converts to a computer station. The cubby system houses the monitor and disk drive



Magic Computer Input/Output Mug, Sweet Gum



Windsor PC Roll Top Desk, Windsor Hardwood Furniture Mfg.

unit, the center drawer converts to a keyboard stand, and a unit holding the printer slides out of the desk's cabinet.

A full-extension letter/legal size file drawer and two secret compartments are additional features. The desk is lockable, stained and lacquered, and fitted with solid brass hardware.

(List Price: \$1,995)

Windsor Hardwood

Furniture Mfg.

964 Piner Rd.

Santa Rosa, CA 95401

(707) 527-8558

CIRCLE 784 ON READER
SERVICE CARD

PUBLICATIONS

Public Domain Software

A guide to hundreds of public domain and user-supported programs, including software from computer clubs, bulletin boards, and private individuals. Areas covered in the book include financial and stock market analysis, word processing, communications, data bases, BASIC utilities, games using color graphics, Pascal and assembly language programs, programming languages, graphics drawing utilities, spreadsheet tem-

plates, and RAMdisks.

Programs are also available on disk, either individually or in sets.

(List Price: book, \$2.95)

PC Software Interest Group

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(408) 247-6303

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Word Processor Comparison Tables

Tables providing head-to-head comparisons of more than 150 features of 400 leading word processing programs, with separate comparison tables for computers from a number of manufacturers.

Also included with the comparison tables are guidelines for selection of appropriate software features (letters, documents, mass mailings, interfaces to spreadsheets, etc.), and a checklist for contract negotiations.

(List Price: \$39.95)

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Mattawan, MI 49071

(616) 668-2049

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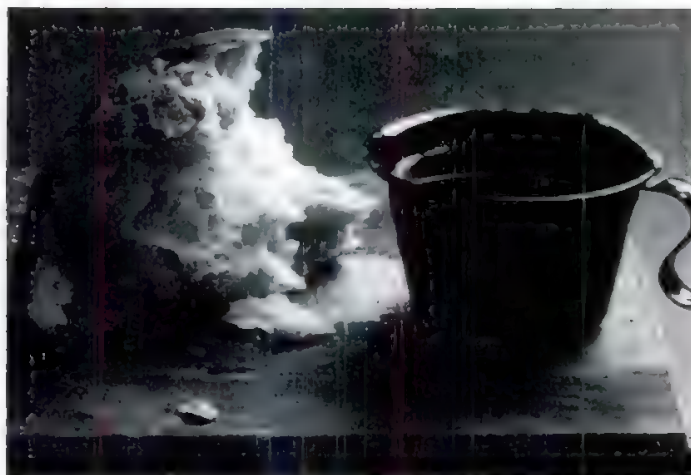
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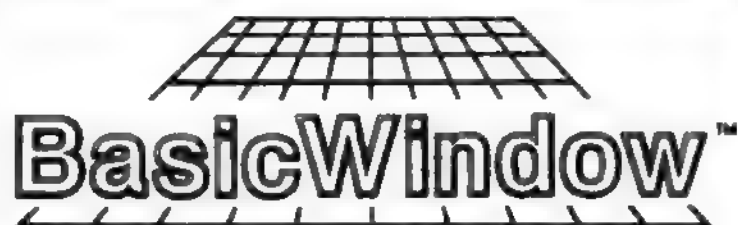
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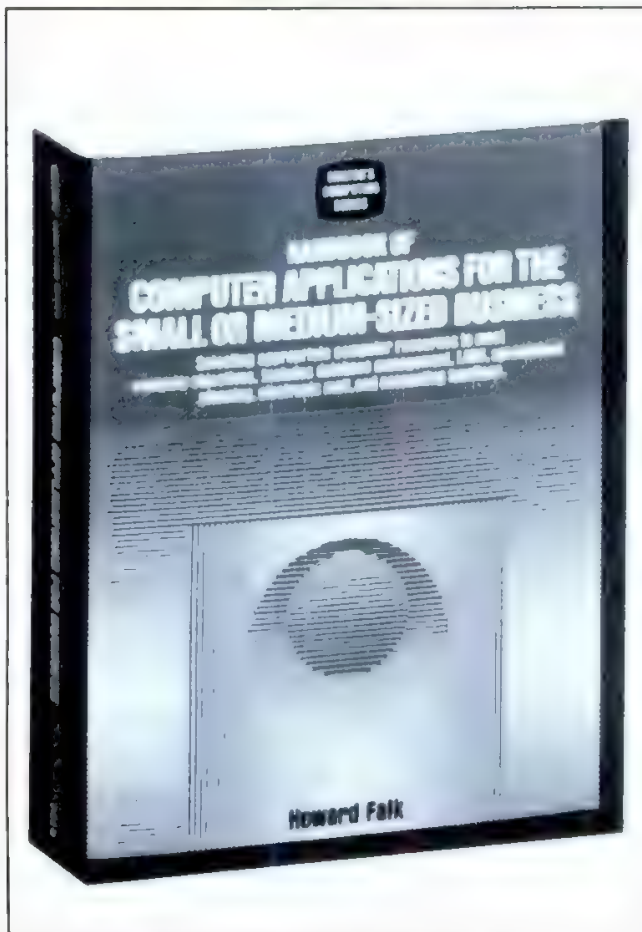
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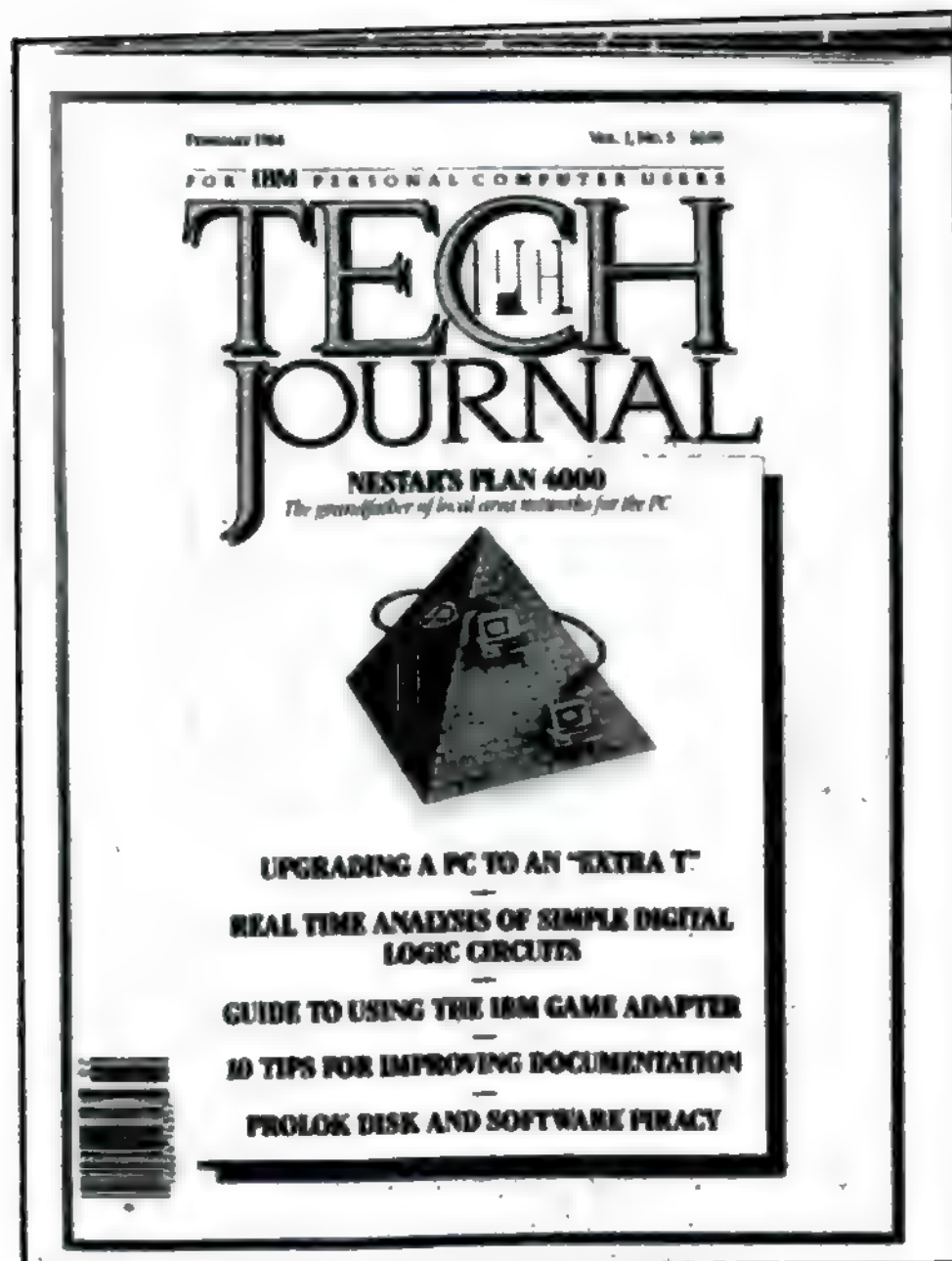
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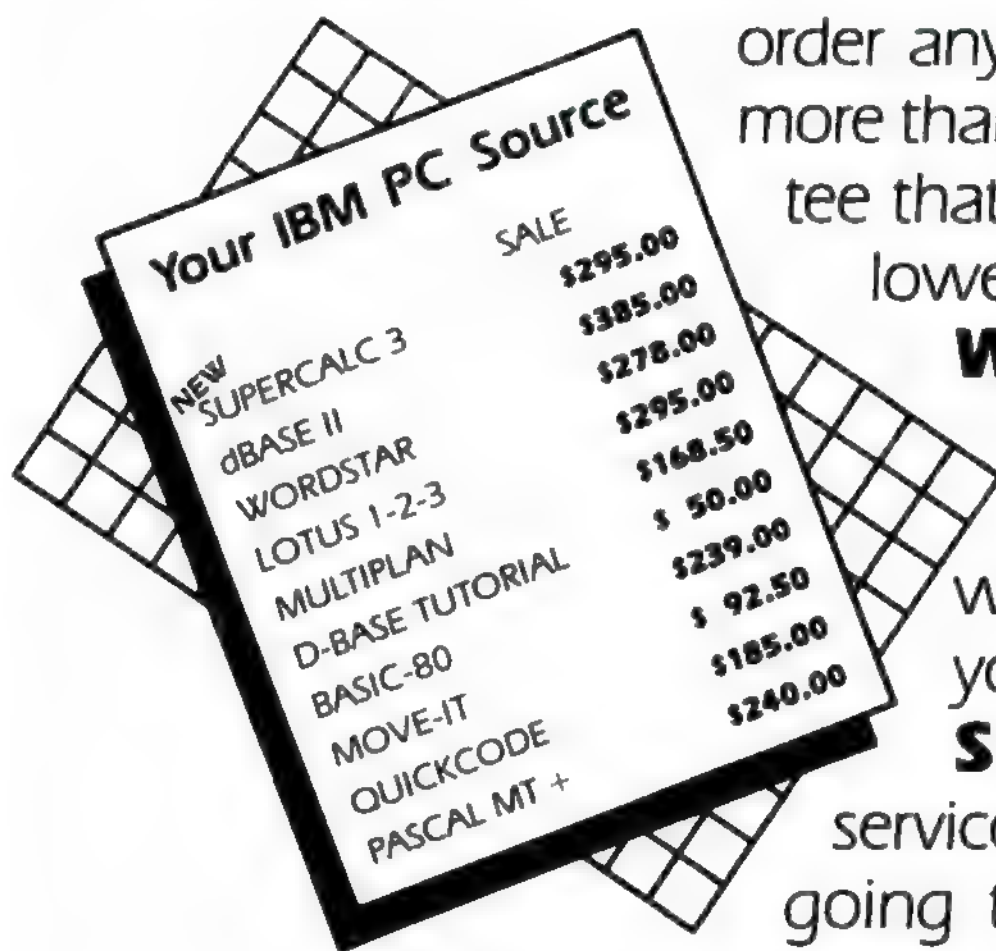
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Starting off with an easy-to-understand explanation of how to use the IBM PC, your kids will progress quickly to flow charts and simple print programs...to loops, graphics, and other programming concepts that show the young user how to make the PC do exactly what he wants—in non-technical language that makes life easier for both of you.

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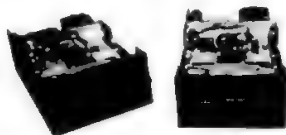
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NYPC: The NY IBM Personal Computer Users Group

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Picture City Personal Computer Programming Club

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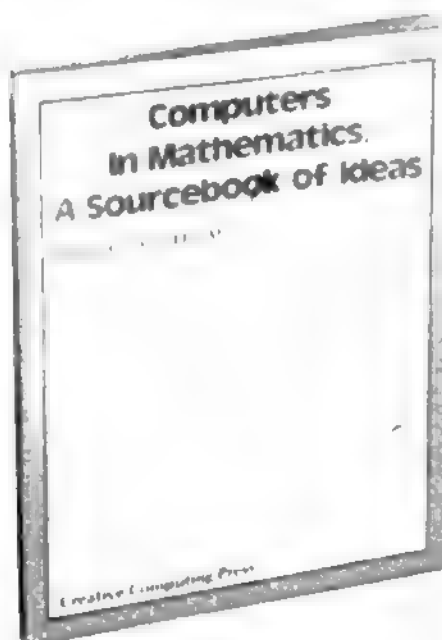
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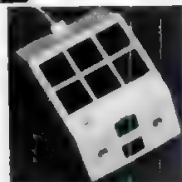
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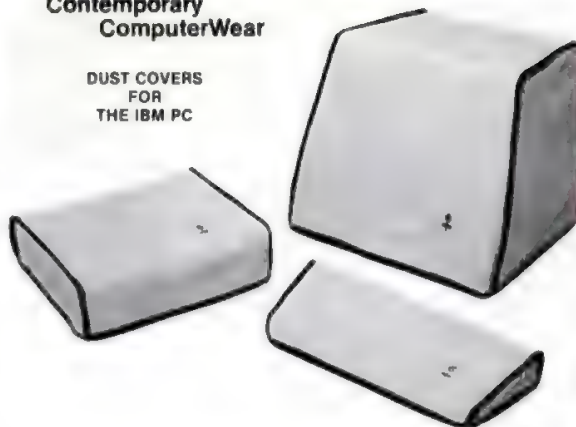
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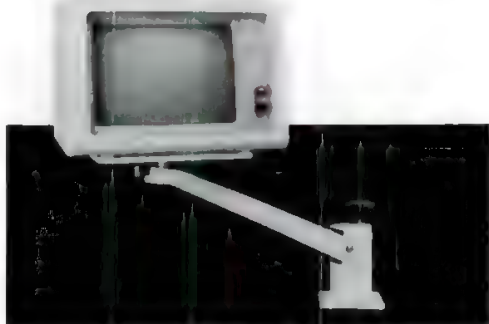
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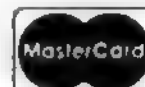
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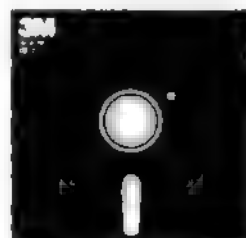
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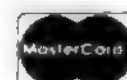
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801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825
826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875
876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

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Metastring Magic

Part two of a discussion of ANSI.SYS demonstrates how to reassign keys and change the computer's display format.

Readers of the first part of this two-part introduction to ANSI.SYS will remember that PROMPT is the one command in DOS 2.0 that permits you to enter an escape character without deleting your current line (see "Driving with ANSI.SYS," PC, Volume 3 Number 7). The escape is essential for transforming ordinary text characters into commands to a peripheral or its device driver to, for instance, control the display or reassign keys. PROMPT accomplishes this feat with the metastring \$e (see Figure 1). When inserted in a PROMPT statement, this metastring, with its ability to generate an ASCII escape character, unlocks the power of ANSI.SYS.

The keyboard reassignment example from Chapter 13 of the DOS 2.0 manual illustrates the procedure. It suggests that we send ANSI.SYS an escape followed by the string [0;68;"dir";13. To do this when the system prompt A> appears, type:

```
PROMPT $e[0;68;"DIR";13p
```

and press Enter. You'll discover that the system no longer gives you any prompt at all. This is because the entire string has been used as a command by ANSI.SYS. Entering PROMPT with nothing following will bring back the A>, but there has been another change. If you press function key F10, you'll find that it now invokes



the DOS directory command. PROMPT has sent a command to ANSI.SYS to effect the reassignment.

Reassigning Keys

Each of the three statements that follow is a valid form for a keyboard reassignment:

```
Esc [#;#;. . . ;#p
Esc [#;"string"p
Esc
[#;#;"string";#;. . . ;#p
```

The first number sign (#) is the keyboard code of the key to be reassigned. The remaining #'s and strings are the ASCII characters to be assigned to the key. If the first # is zero, however, the second # becomes part of the keyboard code, because two-digit extended ASCII codes

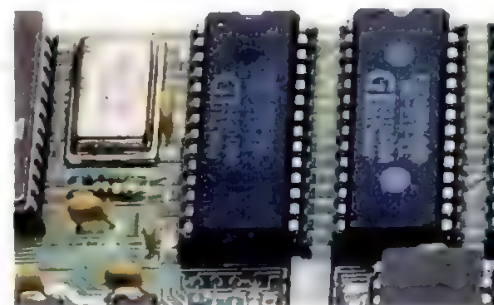
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**1200 Baud,
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PC 212A/1200:

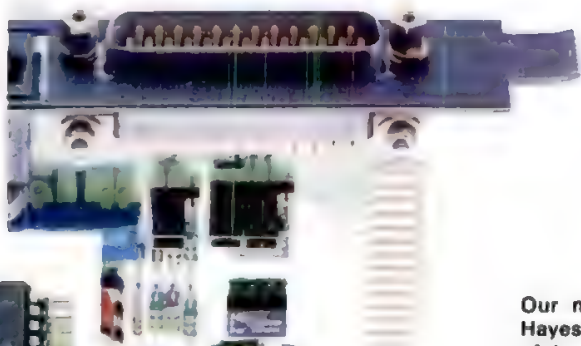
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ADVANTAGE #3

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PROGRAMMING

are being used. Keyboard codes are listed in Figure 2. With them, we could produce a series of PROMPT commands such as those in Figure 3. They can be entered one at a time or placed in a batch file called ALTKEYS.BAT. Invoking the ALTKEYS file will now make the following assignments to these combinations of the Alt key and the function keys:

- Alt-F1 Lists the directory of drive A
- Alt-F2 Lists the directory of drive B
- Alt-F3 Clears the screen
- Alt-F4 Shows the current disk volume
- Alt-F5 Turns Break function on (default setting)
- Alt-F6 Turns Break function off
- Alt-F7 Turns Verify mode on
- Alt-F8 Turns Verify mode off (default setting)
- Alt-F9 Enters Reverse Video mode
- Alt-F10 Restores normal white on black display

Suddenly, 10 new function keys are avail-

able under DOS, and you didn't have to buy any new software. Other reassignments are possible. Just use PROMPT as though it were a reassignment command and substitute \$e where Chapter 13 directs you to use escape.

Positioning the Cursor

Now that the link between PROMPT and ANSI.SYS has been established, the system prompt can be used to perform some really clever operations. The next example illustrates control of the cursor position. Try entering:

```
PROMPT $e[s$e[1;1H$e[k
$e[60C$t$h$h$h$e[u$n$g
```

This sequence saves the cursor position (Esc [s), moves the cursor to the first row and column (Esc [1;1H), clears the row (Esc [k), moves the cursor to the sixtieth column (Esc [60C), displays the current time (\$t), backspaces three times to erase the hundredths of seconds (\$h\$h\$h), returns the cursor to its saved position (Esc [u), and gives the standard prompt of the default drive (\$n\$g). You might call this the poor man's clock display.

PROMPT can also control the display format or attributes. You can use it like the MODE command to select color or black-

1. The values generated by these metastrings change during the operation of your programs and cannot be known in advance.

Metastring	Will be replaced by
\$d	the system date
\$t	the system time
\$n	the default drive
\$p	a directory of the default drive
\$v	the DOS version number

2. These metastrings generate characters that would otherwise be given a different interpretation by DOS when they are entered.

Metastring	Will be replaced by
\$h	a backspace over the previous character
\$S	a dollar sign "\$"
\$g	the ">" character
\$l	the "<" character
\$b	the " " character
\$q	an equals sign "="
\$-	a carriage return and linefeed
\$e	an escape, ASCII 27

Figure 1: A listing of metastrings. DOS takes everything that follows a PROMPT command to be the new prompt, but it does not take all characters literally. The characters in these metastrings are automatically redefined.

PROGRAMMING

and-white display, 80- or 40-column width, and graphics or character displays. In the following examples, it is used to put

PROMPT can also control the display format or attributes. You can use it like the MODE command.

the display in Reverse Video mode and return it to normal. Enter:

```
PROMPT $e[7m$e[2J$n$g
```

This sequence begins Reverse Video mode (Esc [7m), clears the screen to reverse all cells (Esc [2J), and then presents the standard prompt. Entering:

```
PROMPT $e[0m$e[2J$n$g
```

returns the screen to normal white on black. These commands can be placed in separate batch files.

The examples I have included here are only some of the possibilities. I hope they show you that PC-DOS is more than the sum of its parts. ANSI.SYS and PROMPT are useful by themselves, but together, they can really expand your control over your computer. ANSI.SYS will let you reassign any of the keyboard codes defined by DOS, give you control over the location and movement of the cursor, and let you change the attributes of your display. PROMPT lets you change the signal DOS uses to show that it is ready to accept a command. By including metastrings, it allows you to show the time, date, default disk drive, and so forth in the prompt. Most significantly, PROMPT has a metastring for the ASCII escape code that allows it to include ANSI standard control sequences. When ANSI.SYS is installed, PROMPT can use its features to enhance the display, for example, with the poor man's clock. PROMPT can also serve as a

command generator for the console driver, providing the direction to reassign keys and alter display formats. IBM has cer-

tainly added new capabilities to DOS 2.0; it's just a matter of figuring out how to use them. ■

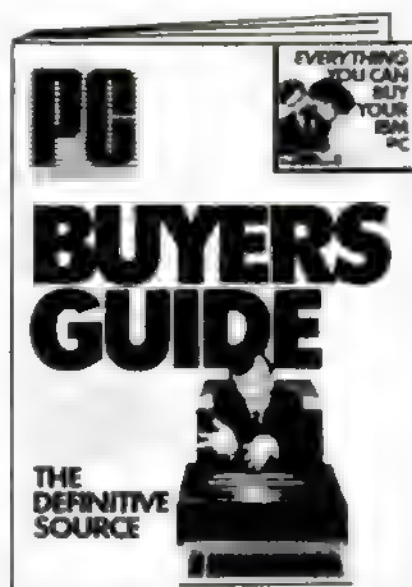
Key	Code	Key	Code	Key	Code
Null	3	F1	59	Ctrl F1	94
Back Tab	15	F2	60	Ctrl F2	95
Alt Q	16	F3	61	Ctrl F3	96
Alt W	17	F4	62	Ctrl F4	97
Alt E	18	F5	63	Ctrl F5	98
Alt R	19	F6	64	Ctrl F6	99
Alt T	20	F7	65	Ctrl F7	100
Alt Y	21	F8	66	Ctrl F8	101
Alt U	22	F9	67	Ctrl F9	102
Alt I	23	F10	68	Ctrl F10	103
Alt O	24	HOME	71	Alt F1	104
Alt P	25	Cursor Up	72	Alt F2	105
Alt A	30	Page Up	73	Alt F3	106
Alt S	31	Cursor Lft	75	Alt F4	107
Alt D	32	Cursor Rit	77	Alt F5	108
Alt F	33	End	79	Alt F6	109
Alt G	34	Cursor	80	Alt F7	110
		Dwn			
Alt H	35	Page Dwn	81	Alt F8	111
Alt J	36	Ins	82	Alt F9	112
Alt K	37	Del	83	Alt F10	113
Alt L	38	Ctrl PrtSc	114	Shift F1	59
Alt Z	44	Ctrl Cursor		Shift F2	60
Alt X	45	Left	115	Shift F3	61
Alt C	46	Ctrl Cursor		Shift F4	62
Alt V	47	Right	116	Shift F5	63
Alt B	48	Ctrl End	117	Shift F6	64
Alt N	49	Ctrl PgDn	118	Shift F7	65
Alt M	50	Ctrl Home	119	Shift F8	66
Alt 1	120	Ctrl PgUp	132	Shift F9	67
Alt 2	121	Alt =	131	Shift F10	68
Alt 3	122	Alt -	130		
Alt 4	123	Alt 5	124		
Alt 6	125	Alt 7	126		
Alt 8	127	Alt 9	128		
Alt 0	129				

Figure 2: A listing of keyboard codes. These codes, generated by the IBM PC keyboard and sent to the console device driver, are used in commands to ANSI.SYS to indicate which keys are to be redefined.

```
PROMPT $e[0;104;"DIR A:";13p
PROMPT $e[0;105;"DIR B:";13p
PROMPT $e[0;106;"CLS";13p
PROMPT $e[0;107;"VOL";13p
PROMPT $e[0;108;"BREAK ON";13p
PROMPT $e[0;109;"BREAK OFF";13p
PROMPT $e[0;110;"VERIFY ON";13p
PROMPT $e[0;111;"VERIFY OFF";13p
PROMPT $e[0;112;"PROMPT $e[7m$e[2J";13;"PROMPT";13p
PROMPT $e[0;113;"PROMPT $e[0m$e[2J";13;"PROMPT";13p
PROMPT
```

Figure 3: PROMPT commands for defining combinations of the Alt key and various function keys.

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EDITED BY PAUL SOMERSON

User-to-User

PC readers use this forum to share their questions, comments, and complaints.

One Drive Blues

PC-XT users often complain about the lack of two floppy drives. While there are many problems caused by having 360K on one side of your computer and 10 megs on the other, the gripe we hear the most is that it's difficult to copy floppies on an XT. This really isn't true.

One obvious solution is to buy a pair of half-height drives and replace the single full-size standard-issue floppy drive. This will cost you anywhere from \$400 on up, and does work fairly well, if you buy the right pair (we'll be reviewing half-heights in a future issue).

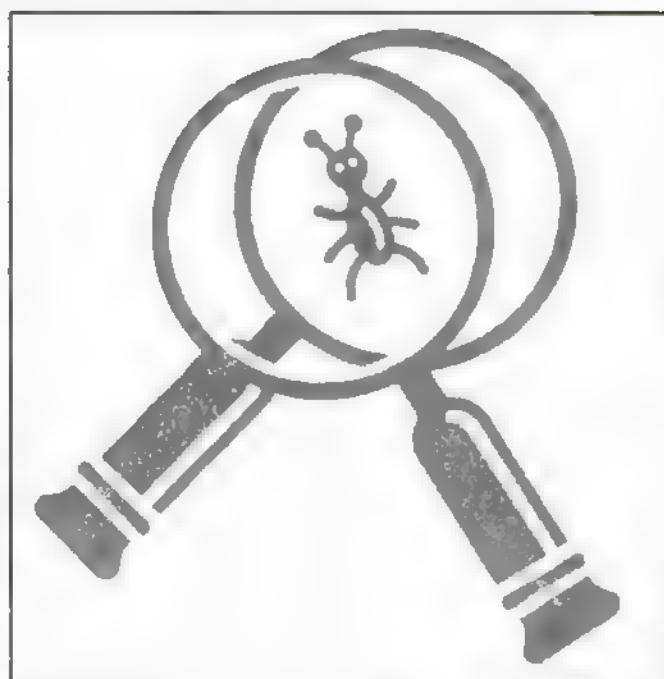
But even if you have the garden variety single-floppy configuration, making backups is a snap. Just get into your favorite word processor (one that can produce pure ASCII text without a welter of control characters—we use WordStar in nondocument [N] mode for this), open a file called KOPY.BAT, and type in the contents of Figure 1.

If you don't have a handy ASCII word processor, you can use EDLIN (heaven forbid) or just type in at the DOS C> prompt:

COPY CON:KOPY.BAT

then type the above eight lines exactly as they appear in Figure 1, and then hit the F6 function key.

Either method will create a batch file called KOPY.BAT that will do all your backing up automatically. To use it, make



sure the KOPY.BAT file is on your hard drive. Log onto drive C: and put the floppy you want to copy into drive A: then type:

KOPY

The batch file will set up a temporary sub-directory called KOPYTEMP, log into it, copy all the files from your floppy, prompt you to replace the original floppy with a formatted blank disk, copy the files back to the blank disk, erase everything from the temporary subdirectory, and then delete the subdirectory. Okay, it's trivial, but it works, and it's very easy to use.

Caveat computer: One of the lines in the batch file (del *.*) will erase all the files in your subdirectory. Before it goes ahead, it will ask you the terrifying question:

Are you sure (Y/N)?

```
md\kopytemp
cd\kopytemp
copy a:*. *
pause ==> PUT A NEW, FORMATTED DISK IN DRIVE A:
copy *. * a:
del *. *
cd\
rd\kopytemp
```

Figure 1: An automatic backup batch file.

Be brave and hit a Y and then the Enter key. So long as you're in a subdirectory, this will erase only the contents of that subdirectory. But be careful. If you've typed the batch file carefully, and watch the screen to make sure you're logged into the KOPYTEMP subdirectory properly, you'll be fine. If you screw up, however, and you're not logged into this subdirectory, well, that's what backups are for. Back up your hard drive weekly.

—P.S.

Double Trouble

A baffling phenomenon occurs when you use BASICA, double precision, random files, and sequential files together. In an IF-THEN statement comparing two numbers, the computer seems to lose its mind under certain circumstances. The computer may print two numbers identically on the screen but treat them as NOT equivalent when manipulating them mathematically. This is caused by the way files are stored.

Random files are stored on a disk in binary format, while sequential files are stored in ASCII format. When two identical numbers—one of which was stored in a random file and the other in a sequential file—are input to memory from a disk, the computer may think they are slightly different when evaluating them in an IF-THEN statement. This difference may be on the order of .0000000000001 or even less!

The solution to this aggravation is not to use IF A=B THEN. . . Instead, use IF ABS(A-B)<1.D-10 THEN. . . I have

found that the difference was never more than 1.D-13 and often as little as 1.D-19 for the numbers I tried. Under most circumstances, using 1.D-10 would be satisfactory.

One of my pet gripes with IBM BASIC's random filing system is the need for LSET, MKD, CVD, and similar statements and functions, and the requirement that twice as many variables as you really need be used. This results in a great deal of unnecessary complication and coding. My 9-year-old WANG BASIC is much less complicated, and equally fast in random access. I wish I could buy a BASICA for the IBM that did not use these kinds of statements and functions.

Nathan Janco
Tulsa, Oklahoma

There are other IBM-compatible versions of BASIC on the market. Microsoft's brand boasts many powerful features, but lacks others that are equally useful. And while many competitive BASICS do offer new features, they can also introduce new headaches. Still, watch for several very interesting new species of BASIC to be released by the end of this year.

Batch File Sorts

In DOS 2.0 and 2.1, it's easy to use batch files and filters to list your files alphabetically by filename, filename extension, or by the size of the file. To do this, create a batch file called SDIR.BAT by typing in the code (but not the A> prompt) below:

```
A>COPY CON: SDIR.BAT
```

then hit the Enter key

```
DIR %1: ISORT /+%2 > %3
```

then hit the F6 key, and then the Enter key.

The vertical bar character (|) before the word SORT is the DOS "piping" symbol (it's the uppercase backslash—the key to the left of the Z). You'll then see on the screen:

```
1 File(s) copied
```

In this batch file, %1 designates the drive containing the directory to be sorted, %2 stands for the column number of the directory to be sorted, and %3 is the filename which it is to be saved under. Note that since there is a colon after the %1, you won't have to enter a colon when you tell SDIR.BAT which disk to sort.

To sort drive A alphabetically (using the first column), you would type in:

```
A>SDIR A 1 A:ASRT.DIR
```

then hit the Enter key and you'll see on the screen:

```
A>DIR A: ISORT /+1 > A:ASRT.DIR
```

For alphabetization of the FILE EXTENSION, type in 9 instead of 1. Type:

```
A>SDIR A 9 A:FXSRT.DIR
```

then hit the Enter key.

For the DIR to be listed by the size of the files, replace the 9 with 13:

```
A>SDIR A 13 A:SZSRT.DIR
```

and you'll get the same results as above but a different sorting of the directory. You can also get a reverse order listing of the directory by typing /R after the column number:

```
A>SDIR A 13/R A:RSRT.DIR
```

and hitting the Enter key.

Once you've created these sorted directory files, to use them just type the DOS TYPE command. To view the initial alphabetical listing described above, for

USER-TO-USER

instance, type in:

```
A>TYPE ASRT.DIR
```

then hit the Enter key and you'll see all the files on your disk rearranged alphabetically by filename.

Matthew J. Carothers
Round Rock, Texas

This is a good combination of batch files and filtering. If you try this, make sure your SORT.EXE file (it's on your DOS disk) is on the disk you're sorting. Most users don't bother experimenting with some of the more exotic features of DOS 2.X, such as batch files with replaceable parameters, piping, and filters. The reason is probably that the DOS 2.0 manual is badly indexed, haphazardly organized, thoroughly abstruse, and dense with errors. DOS 2.1 is a bit better, but still has a way to go.

You can add a line to the batch file to copy the sorted file to your screen or printer. In fact, it's probably best to have three batch files on your disk, SDIR.BAT to create sorted files, PSDIR.BAT to create them and print them out on your printer, and SSDIR.BAT to create them and print them on your screen. To create these last two, type the code and follow the instructions below. For the printer version, type:

```
A>COPY CON: PSDIR.BAT
```

then hit the Enter key, then type:

```
DIR %1: ISORT /+%2 > %3
```

then hit the Enter key, then type:

```
COPY %3 LPT1:
```

then hit the F6 key, and then the Enter key. For the screen version, type:

```
A>COPY CON: SSDIR.BAT
```

then hit the Enter key, then type:

```
DIR %1: ISORT /+%2 > %3
```

then hit the Enter key, then type:

```
COPY %3 CON:
```

then hit the F6 key, and then the Enter key.

Hi-Res Magic

Several months ago, "User-to-User," (PC, Volume 2 Number 2) you published a composite color trick by David McManigal. The program in Figure 2 allows owners of RGB monitors to see the same unusual color effects. If you want to be extremely weird, you can use OUT &H3D8,8 in line 130, but the characters as well as the line graphics will appear as "flags."

Greg Koskinen-Dodgson
Edmonton, Alberta, Canada

If you have an RGB monitor (such as the one sold by IBM), and you're tired of the same old drab Screen 2 grey-on-black, try typing this in. There are many possibilities for improved hi-resolution multicolor graphics using this technique. For an even better display, add the three lines in Figure DDD and tap any key a few times. Then hit any key several times and watch the effect. With all this potential for new modes and better use of colors, it's a real shame IBM limited the selection available through normal BASIC commands. (There are several new ones on the PCjr.)

Dangerous Programs

Users often wonder if it's possible to write a program that would damage their hardware. The answer is usually no. In BASIC, this is probably true. However, I wrote a disk copy routine in Assembler that actually caused the head of the disk drive to go totally out of alignment, necessitating an expensive repair bill caused only by the program!

I recommend great care when using BIOS routines to access the disk drive. As I discovered, their improper use can physically damage the drive.

Alan Lefor, M.D.
Syracuse, New York

Gulp. A lesson here—take care in playing with guts-level routines.

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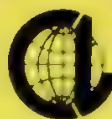
```
100 'Hi-res color demo -- by Greg Koskinen-Dodgson
110 SCREEN 2:WIDTH 80:KEY OFF:CLS
120 OUT 985,0
130 OUT &H3D8,10
140 LOCATE 20,2
150 PRINT "0000 0001 0010 0011 0100 0101 0110 0111 ";
160 PRINT "1000 1001 1010 1011 1100 1101 1110 1111"
170 FOR COLR=0 TO 15
180 FOR N=0 TO 9
190 X=(40*COLR)-(4*N)
200 IF COLR >7 THEN LINE (X,0)-(X,150)
210 IF COLR AND 4 THEN LINE (X+1,0)-(X+1,150)
220 IF COLR AND 2 THEN LINE (X+2,0)-(X+2,150)
230 IF COLR AND 1 THEN LINE (X+3,0)-(X+3,150)
240 NEXT:NEXT
```

'hi-res screen
'background color
'disable mono override
'position labels
'left labels
'right labels
'16 colors displayed
'40 pixels/color
'set x-axis reference
'display vertical line
'minus spacing is 1
'pixel at 14mhz, or
'25 PERIOD, 3.58 MHZ

Figure 2: Hi-res color trick for RGB monitors.

```
250 I$=INKEY$:IF I$="" THEN 250 ELSE K=(K+1) MOD 128
260 OUT 985,K
270 GOTO 250
```

Figure 3: Addition to 2 to enhance color display. Type it in then tap any key.



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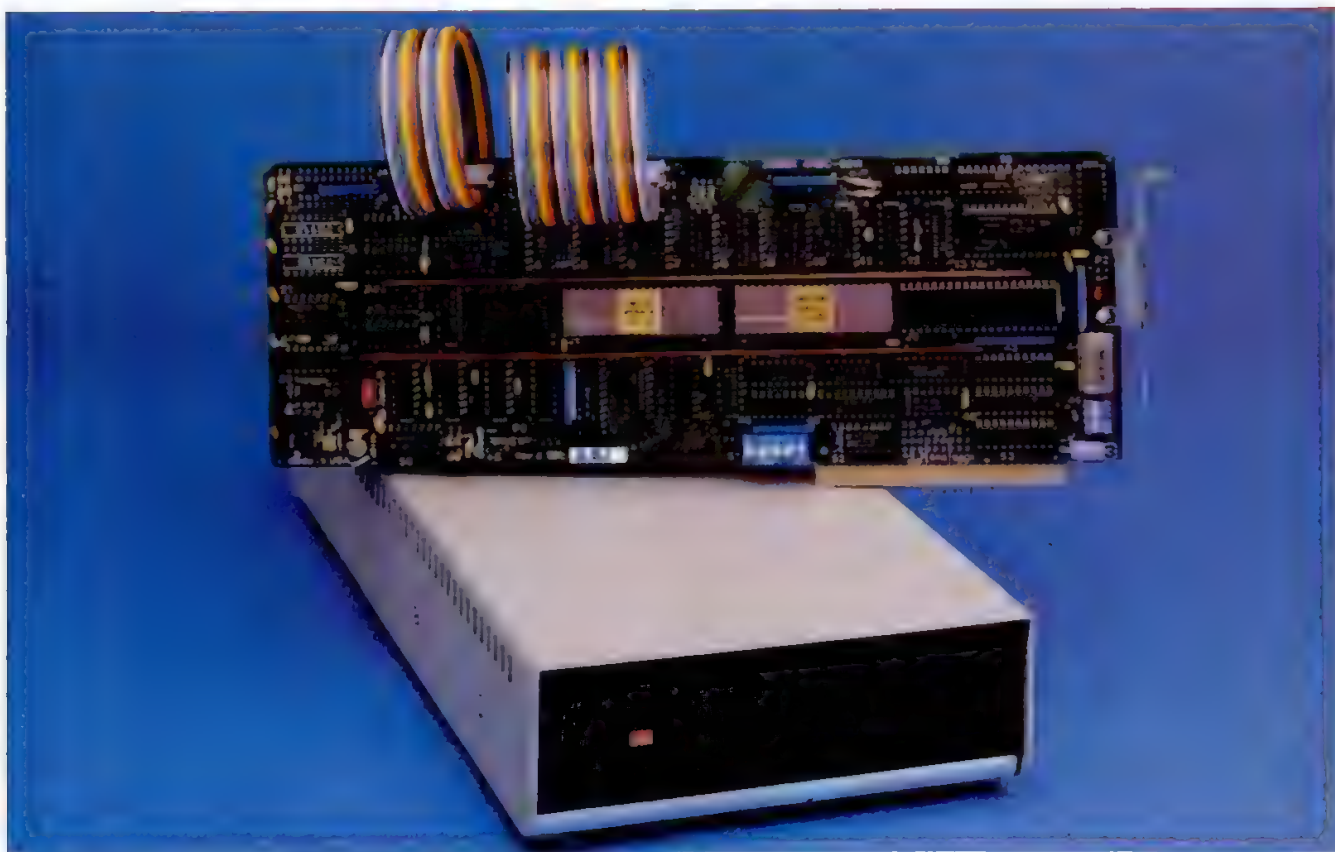
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CIRCLE 210 ON READER SERVICE CARD

PC Tutor



PC versus TVs

Q: When my computer is turned on, the televisions in our home become difficult to view—their screens have a lot of static and snow. This problem is worst on channel 5 and, to a lesser degree, channels 9 and 12.

The computer is powered by its own electrical circuit, connected directly to the main electrical panel. An outside wall separates the computer from the main TV antenna, but they're only about 20–25 feet apart. The televisions connected to the main coaxial cable are affected most, but the problem also occurs on a portable TV that has its own antenna. I am prevented from computing when my family is viewing television. Please help!

Todd S. Deutch
Cincinnati, Ohio

A: It sounds as if the computer is generating static in your family, as well as on the screens.

Although you didn't describe your sys-

tem's configuration, from the sound of your problem I assume your PC has a color/graphics adapter. There are a number of possible causes and solutions:

- Your monitor may be generating the snow on the televisions. Try turning it off while leaving everything else turned on. If this does the trick, your monitor might need better shielding. A quick solution is to wrap the monitor in foil. Make sure the foil is connected to ground and doesn't cover up the ventilation holes. If this works, you might investigate a more permanent solution, using grounded copper screening that fits inside the monitor.

- The monitor cable may be leaking radio frequencies—a very common problem. If the first test showed no problem with the monitor itself, try disconnecting the cable from the PC (don't just unplug it from the monitor). If this helps, you should buy yourself a new cable that is better shielded. Make sure the cable's ground (the outside metal portions of its connectors) is attached securely to both the PC and the monitor.

- The central unit of the PC may be leaking radio frequencies into the power lines. This could be caused by a hardware failure in the PC—one that might be invisible to other tests. Leave your color monitor on, with the cable attached at both ends, and turn off the PC. If the first two tests had no effect, but the third one helped, this may be the problem.

Unfortunately, it isn't so simple to solve this problem. Try using a power line filter/regulator. Since this device contains filtering components, it should reduce

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PC TUTOR

power-line interference coming from the PC. For maximum benefit, put the filter/regulator as close as possible—electrically—to the PC.

If the power line filter fails to improve conditions on the television screens, you may need to fall back on a solution that will require soldering. First, try the portable with its own antenna. Connect a small capacitor (about .001 uf) between the antenna leads and see if this provides some relief while the PC is running. If this helps, put capacitors between the conductors of the antenna cable used by the other televisions in your house.

- Try shielding the whole main unit of the PC with foil that is grounded to the body. (Again, be sure to leave the ventilation holes open.) If this works, try tightening the screws on the body of the PC to improve the connection to ground. If this doesn't work, but the foil still helps, then you're really in trouble. After all, who wants a PC wrapped up in kitchen foil?

Radio frequency (RF) interference is a tricky thing to diagnose and fix. If the above tests and solutions don't work, ask someone with an RF field strength meter to check over your computer system to find the source of the interference. Most amateur radio (and some CB) operators are familiar with this sort of problem.

Keeping Pace with a Mainframe

Q: As a student, I usually use my PC to communicate with my school's mainframe computers. However, when I download large files to my printer, I'm plagued by purges and "communication buffer overflow" error messages.

I do my work at 300 baud and use the PCModem software package (Solution Software Systems, 3930 Whispering Trails, Hoffman Estates, IL 60195). I've tried expanding the communication buffer and tried writing the file to disk before printing. Both attempts only delay the inevitable. Is there anything else I can do, short of buying a print spooler?

Don Wilkin

Wayne, New Jersey

A: Nearly 2 years ago, when I reviewed PCModem for another magazine, I encountered the same problem. To solve it, there are several routes I discovered, which you can try too:

- Compile the PCModem program so it will run faster. This won't help you print while receiving the transmitted files, but it may work fine if you write the files to disk during the session and print the results later on.

- Most large computers are able to accommodate slow-printing terminals. If the mainframe treats your PC like such a terminal, it will transmit a number of non-printing characters at the beginning of each line. However, the version of PCModem I tried for the review would display those null characters! I hope Solution Software Systems has fixed that bug by now.

- Try using handshaking. Most mainframes will temporarily stop transmission upon receipt of an Xoff character (Ctrl-S) and resume upon receipt of an Xon character (Ctrl-Q). While your PC is on-line, try to file the results rather than printing them. Then, before you write the information to a disk file, have PCModem send a Ctrl-S to the mainframe. After each portion of the file is written to disk, send a Ctrl-Q to resume transmission. In this way, your system should run quickly enough during transmissions, and during the pauses for disk operations no data will be transmitted.

PCModem is written in interpreted BASIC, which gives you the opportunity to edit the program. If you don't like trying to fix up a long, uncommented BASIC program (I don't either), you may find that PC-Talk will work better in your situation. It's a freeware program that's offered by the Headlands Press (P.O. Box 862, Tiburon, CA 94920).

DATE Strikes Out at Midnight

Q: I have a problem with the date feature on my IBM PC that runs PC-DOS 2.0. The problem happens at midnight, the time when the date is supposed to change

PC TUTOR

to the next day. I've found that the date is not updated correctly if any disk-related process occurs before I run the DATE routine or access DATE\$ from BASIC at or after midnight. If I request the date before any other disk activity happens, however, the date is changed correctly.

This example should expose the problem. While in PC-DOS, enter:

A>DATE

and observe the current date that is displayed. Then set the time to just before midnight by entering:

A>TIME 23:59:59

Make access to the disk by entering:

A>DIR

When the A> prompt reappears, enter:

A>DATE

Notice that the date is unchanged even though midnight has passed. If you repeat the above process, but omit the DIR command, the date will be changed correctly. Could you please tell me how to fix this problem?

Lenny Stendig
Danville, Virginia

A: I never heard of this bug before, but—sure enough—your examples work just as you claimed.

Apparently this is what happens. When the time rolls over at 24:00, the timer-interrupt routine sets an overflow flag in memory at 0040:0070. When you call the time-of-day routine (INT 1Ah) to read the time, this routine resets the overflow flag to zero.

The time-of-day routine returns the overflow flag in the AL register. When the DATE program calls on this routine, DATE is smart enough to increment the date when it finds the overflow flag on.

The disk-driver routines that are in the DOS (not in the BIOS) also use the time-of-day clock. They might use it to time out the disk drive appropriately or to check for read errors. Unfortunately, these routines

do not change the date to the next date even though they are told that the overflow flag is set. And once these routines are run, the overflow flag is reset to zero. If this happens before you ask for the date, the DATE routine won't be told to change to the next day.

This certainly is a bug! And there's no simple way to fix the software. The simplest answer I can think of would require creating a new clock driver for PC-DOS 2.0 that does two things:

First, the driver must substitute a new routine in place of the time-of-day interrupt routine (INT 1Ah). This new routine would not reset the overflow flag unless the routine was called with an argument of 2. (Presently, there are only arguments of 0 for setting the flag and 1 for reading it.) Thus, AH=2 would involve reading the clock and also resetting the overflow flag.

Second, when the new clock driver is called for reading the time or date, it will call the new time-of-day routine with an argument of 2. Hence, the overflow flag will be reset only when a program is called that is able to change the date.

Unfortunately, describing how to program such a solution is beyond the scope of this department. If it's important to you to have dates change correctly at midnight, there's another solution that wouldn't be such a programming project. Just purchase a new clock board that comes with a PC-DOS 2.0 device driver. Since the clock board will handle the time and date, it makes irrelevant any oddities that occur in the reactions of the INT 1Ah routine.

Make sure the board you choose has driver programs for PC-DOS 2.0. Keep in mind that much software is still at the 1.1 level.

The PC Tutor solves practical problems and explains points of general interest. If you'd like to see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016.

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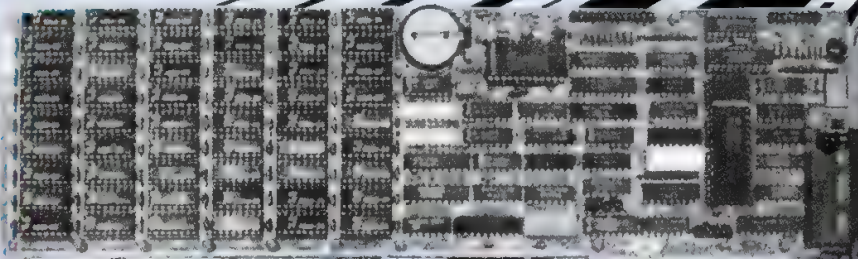
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CIRCLE 720 ON READER SERVICE CARD



If you were just a beginner, what you really wanted was someone to devise a system for you, put it together, and then explain how to use all the pieces together. What you usually wound up with, though, was a modem on the one hand and a program on the other, complete with two separate sets of instructions. Each instruction manual was filled with ifs, ands, and buts about the remaining part of your system, and it was up to you to figure out which ifs, ands, and buts applied to you and which ones you could safely ignore.

That little task is known as systems integration, and it's something you do every time you add something new to your computer system. At its best, systems integration is hardly worth mentioning. At its worst, it's something like trying to assemble a car from scratch using parts

built to both metric and British tolerances.

Luckily, it's generally not that bad. In most cases, when you add to your system, most of the integration has already been done for you, and what's left is pretty trivial. For example, when you buy an expansion board for your PC, you usually don't have to do much more than plug it in. More importantly, the instructions are usually straightforward and very specific, even down to details such as telling you how many screws you have to remove and replace.

The same holds true for most programs; they will generally work on your system without requiring extensive modifications, and they generally have straightforward instruction manuals.

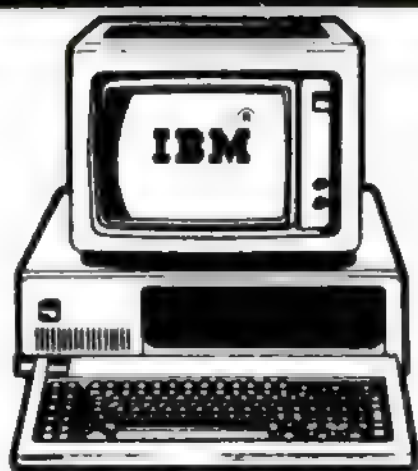
Complicated Communications

Communications presents a more complicated picture. The problem grows out of the number of variations in both modems and communications software.

Without getting into details, a modem may be of the direct-connect variety (plugging directly into the phone system) or it may be acoustically coupled (talking into the phone handset). It could be on a board that fits inside the PC, or it could be a standalone device that connects to the PC by cable. And different modems communicate at different speeds, the two most

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TELECOMMUNICATIONS

common being 300 baud (roughly 30 characters per second) and 1200 baud (roughly 120 characters per second).

Communications programs have their own variations, not the least of which is whether or not they can take advantage of some or all of your modem's capabilities.

The point is that most communications programs are designed to work with just about any modem, while modems, in a vaguely symmetrical arrangement, are designed to work with just about any communications program. Standalone modems can work with nearly any computer system.

One result of this is flexibility. If you really know what you're doing, you can put together a communications package that exactly meets your needs. But sometimes flexibility leads to confusion.

Fortunately, things aren't all bad. There has been a trend toward integration of communications products into packages rather than isolated hardware and software.

Partial Integration

Until recently, buying a standalone modem meant buying a separate cable to allow your computer and modem to talk to each other. This can lead to problems, since different computers need different cables. Now there are at least two modems that come equipped with their own cables: the Anchor Volksmodem and the U.S. Robotics Password. In both cases, the modem comes with a choice of cables for different machines. Specify the IBM PC when you order one, and you'll get the proper connector to plug directly into your communications card. The most difficult part of the hardware integration has been done for you.

Hayes provides another kind of partial integration with its *Smartcom II*. This is a fairly sophisticated communications program designed specifically for Hayes' Smartmodems: the 300, 1200, and 1200B. These full-featured modems have become a virtual standard for modems in the personal computer industry. The

Smartmodem 300 and 1200 are both stand-alone devices. The only important difference between them is their top speed of transmission: 300 baud or 1200 baud. The 1200B is operationally identical to the 1200, but it comes on a board that goes inside your PC. All three modems share a similar set of capabilities and commands.

But the Smartmodem plus *Smartcom II* combination still misses out on being a completely integrated package.

With the standalone versions (Smartmodem 300 and 1200), you have to buy the modem and the program separately, and you have to get a cable and communications card elsewhere. The 1200B, on the other hand, comes with everything you need. In principle, you can plug in the board, load the software, and start communicating. But the 1200B provides two separate manuals, and it's still up to you to read both and integrate the information.

Era 2

All of which brings us back, finally, to the Era 2 personal computer communications system. Notice the name's use of the word *system*. Era 2 was apparently conceived and developed as a fully integrated package, and that's precisely what it is, right down to its manual. Especially its manual.

What you get with Era 2 is the modem board itself, a phone cord for plugging the modem into the phone system, a disk with the Era 2 program on it, and one manual. The manual covers everything you need to know, all carefully explained in logical order in a single place.

The preliminary manual I saw for Era 2 fails to adequately address advanced users. In spite of this, the manual is generally good. It assumes that the reader doesn't know anything about communications, or even necessarily about computers. Refreshingly, it acknowledges that you really don't have to know what technical terms such as "parity" or "duplex" mean, but it also points out that "the more

TELECOMMUNICATIONS

you know, the better off you will be."

The manual's readability is the key. It manages to explain everything from scratch without condescending to readers who might already understand some of the material.

Hooking It Up

To run Era 2, you need 128K RAM and DOS 2.0 (or a later version). The modem uses only one slot, but it includes a piggy-back module that makes it fatter than most boards. This makes no difference on a PC, but the slots on a PC-XT are closer together, so the board effectively uses up two slots on that machine.

The modem has many of the same features as the Hayes 1200B and, according to Microcom, it's very nearly 100 percent Hayes compatible. Just about any software designed for the Hayes Smartmodems can also work with the Era 2 modem. This means that you are not locked into the Era 2 software if you don't like it.

About that "nearly 100 percent" figure: Microcom assures me that, as far as they know, *Smartcom II* is the only Hayes-compatible program that will not work with the current Era 2 modem. This minor incompatibility will be eliminated shortly, and upgrades will be available for those who want them.

On the software side of the package, Microcom provides Era 2 with a reasonably sophisticated communications program, complete with the ability to transfer files with or without MNP, the Microcom error checking protocol. According to Microcom, the MNP protocol will be offered by Telenet and Uninet, and it is being incorporated into communications programs sold by Apple, Tandy, and IBM. MNP may, in fact, become an industry standard. (It would be nice if something would.)

But the specifics of Era 2 are beside the point. Whatever else it has going for it, Era 2 is the first package to provide a totally integrated communications system. As such, it has established a standard for others to match. ■

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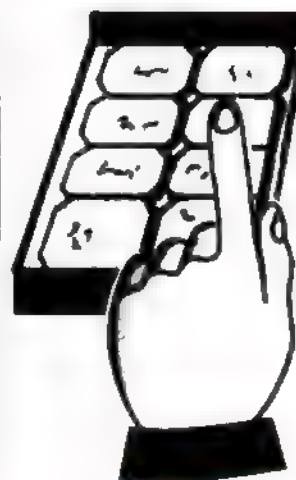
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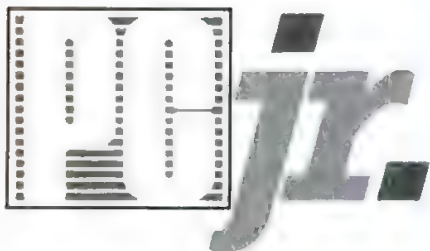
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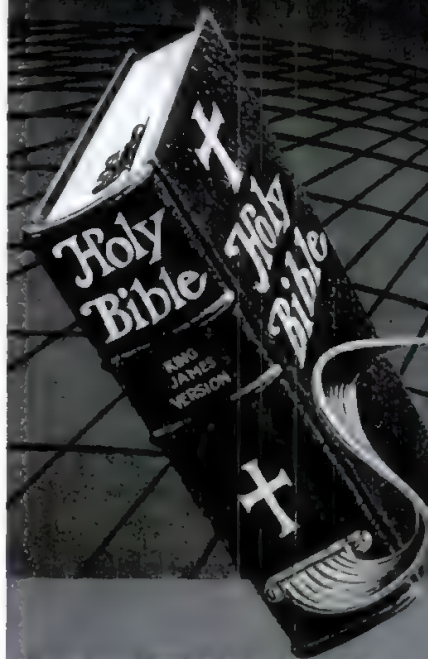
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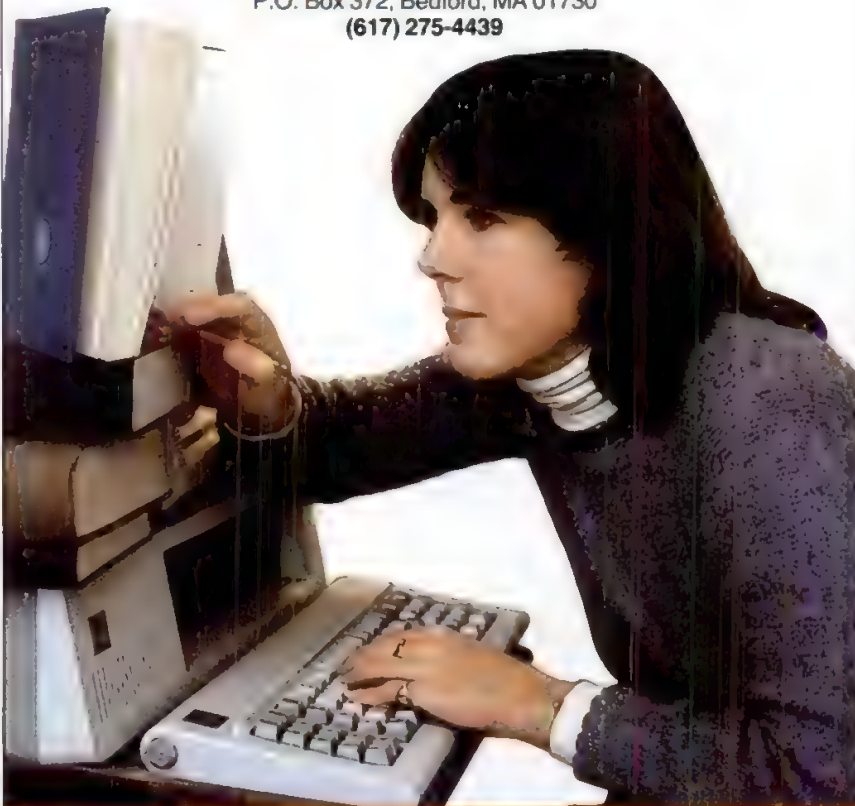
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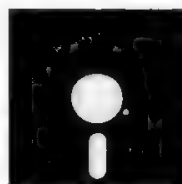
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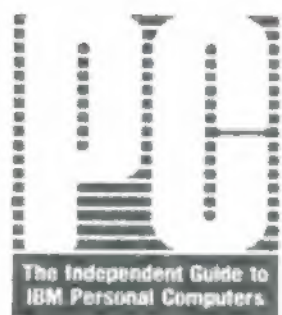
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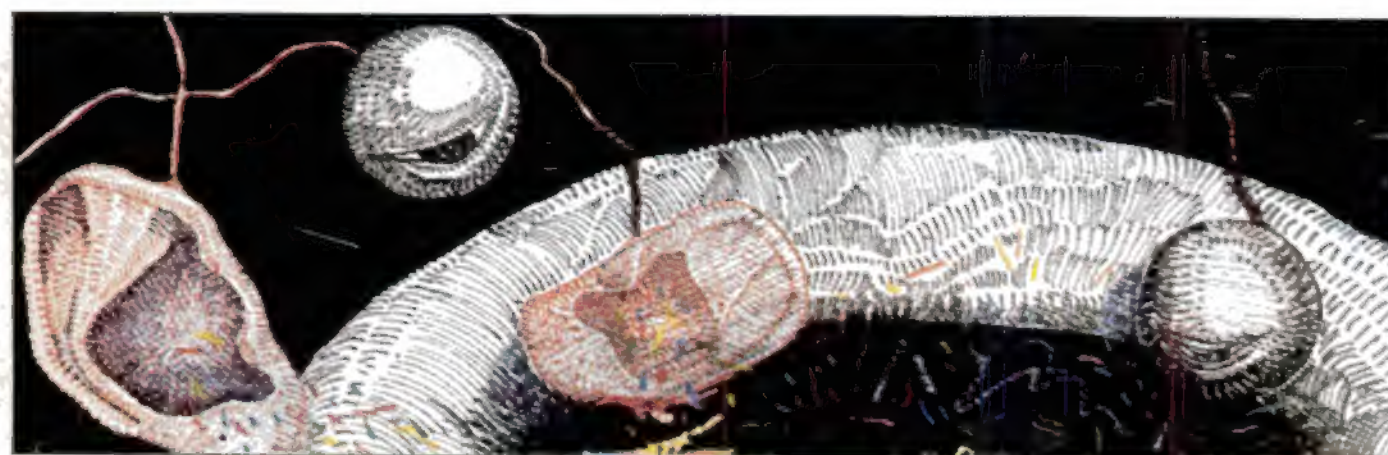
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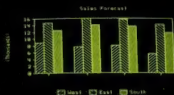
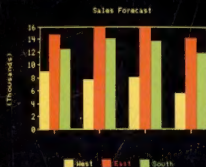
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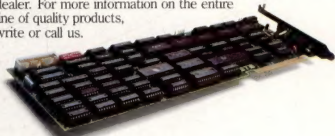
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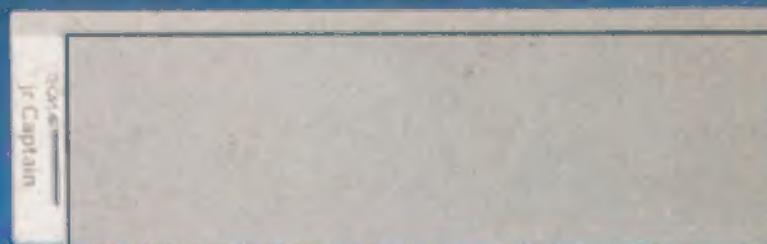


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